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July

MODERN MECHANIX

HOBBIES AND INVENTIONS

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MOTORIZED SURF-BOARD
SEE PAGE 69

FOUND! KING SOLOMON'S GOLD MINES—
THE SECRET OF WAR-TORN ETHIOPIA

JULY 1936

MODERN MECHANIX HOBBIES AND INVENTIONS

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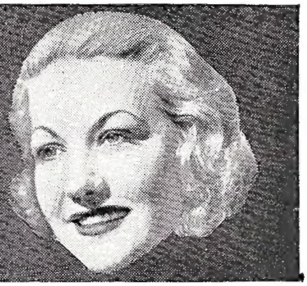
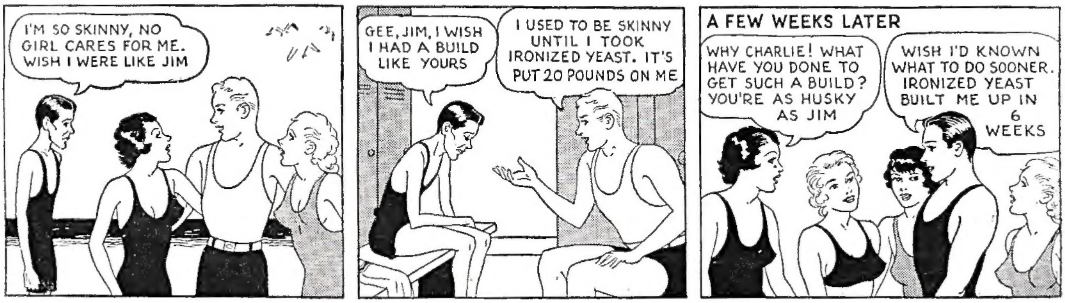
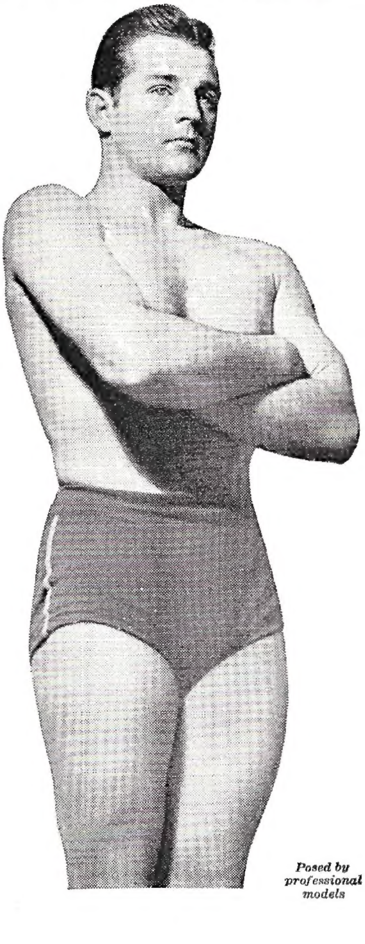
THERE'S A MAN I'D LIKE TO MEET!



Yet a few weeks ago they laughed at his skinny shape



I'M SO SKINNY, NO GIRL CARES FOR ME. WISH I WERE LIKE JIM
GEE, JIM, I WISH I HAD A BUILD LIKE YOURS
I USED TO BE SKINNY UNTIL I TOOK IRONIZED YEAST. IT'S PUT 20 POUNDS ON ME
A FEW WEEKS LATER
WHY CHARLIE! WHAT HAVE YOU DONE TO GET SUCH A BUILD? YOU'RE AS HUSKY AS JIM
WISH I'D KNOWN WHAT TO DO SOONER. IRONIZED YEAST BUILT ME UP IN 6 WEEKS



Posed by professional models

NEW "7-POWER" ALE YEAST OFTEN ADDS 5 TO 15 LBS.—*in a few weeks!*

NOW there's no need for thousands to be "skinny" and friendless, even if they never could gain an ounce before. Here's a new easy treatment for them that puts on pounds of solid, naturally attractive flesh—*in just a few weeks!*

Doctors now know that the real reason why many find it hard to gain weight is they do not get enough digestion-strengthening Vitamin B and blood-building iron in their daily food. Now with this new discovery which combines these two vital elements in little concentrated tablets, hosts of people have put on pounds of firm flesh—*in a very short time.*

Not only are thousands quickly gaining normal good-looking pounds, but also naturally clear skin, freedom from indigestion and constipation, glorious new health and pep.

7 times more powerful

This amazing new product, Ironized Yeast, is made from special cultured ale yeast imported from Europe, the richest known source of Vitamin B. By a new process this yeast is concentrated 7 times—*made 7 times more powerful.* Then it is ironized with 3 kinds of iron.

If you, too, need Vitamin B and iron to build you up, get Ironized Yeast tablets from your druggist at once. Day after day, as you take them, watch flat chest and skinny limbs round out to normal attractiveness, skin clear to natural beauty—you're a new person.

Money-back guarantee

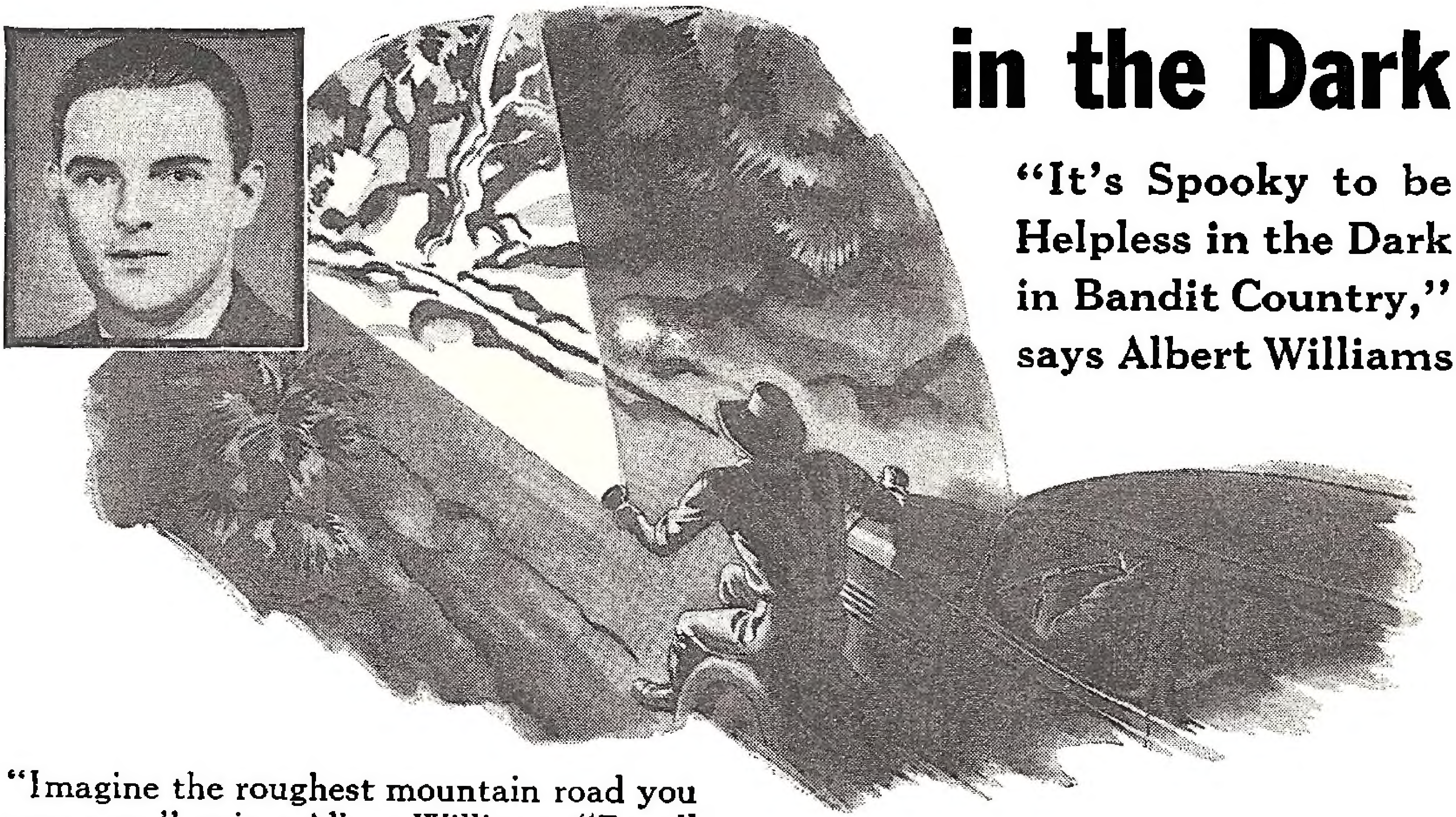
No matter how skinny and rundown you may be from lack of enough Vitamin B and iron, this new Ironized Yeast should build you up in a few short weeks as it has thousands. If not delighted with the results of the very first package, your money instantly refunded.

Only don't be deceived by the many cheaply prepared "Yeast and Iron" tablets sold in imitation of Ironized Yeast. These cheap counterfeits usually contain only the lowest grade of ordinary yeast and iron, and cannot give the same results as Ironized Yeast. Be sure you get the genuine. Look for "IY" stamped on each tablet.

Special FREE offer!

To start you building up your health right away, we make this absolutely FREE offer. Purchase a package of Ironized Yeast tablets at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body." Remember, results with the very first package—or money refunded. At all druggists. Ironized Yeast Co., Inc., Dept. 567. Atlanta, Ga.

A Million Miles from Nowhere . . . in the Dark



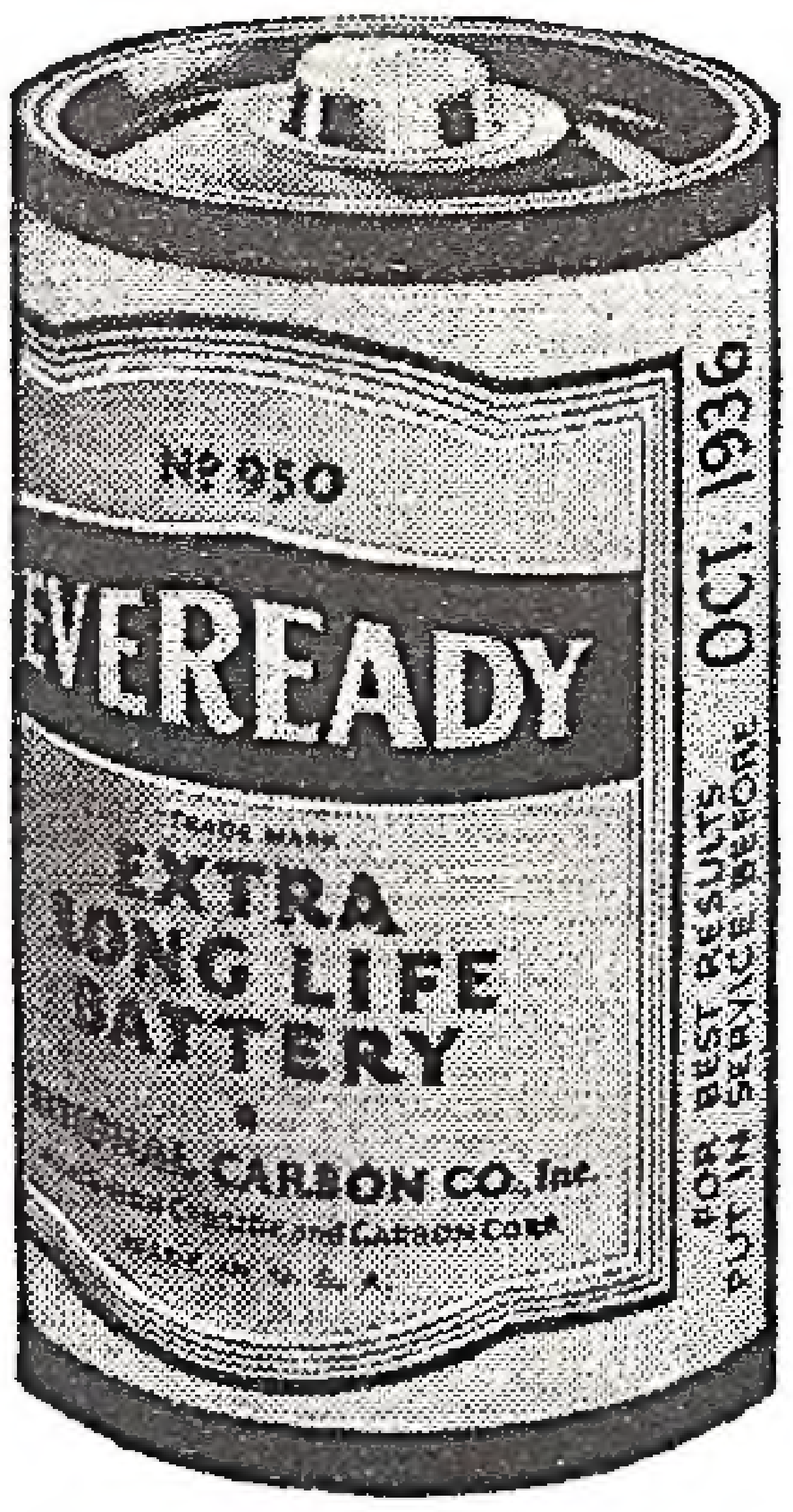
"It's Spooky to be Helpless in the Dark in Bandit Country," says Albert Williams

"Imagine the roughest mountain road you ever saw," writes Albert Williams. "Recall the loneliest spot you were ever in; the things you have read of beasts and bandits in Old Mexico, and you have the midnight setting in which the generator of my car chose to blow up. The thought of a night in that wild mountain pass gave us the shudders.

"It flashed upon me out there in the dark that here was another 'Critical Moment.' Of course! My big Eveready, full of *fresh* Eveready batteries, was the answer.

"So I sat on a front fender holding our improvised headlight while my partner drove through the wild and rocky night to daybreak and breakfast.

"New York seemed a million miles away that night . . . and I thought how lucky it was those batteries were *fresh* when I bought them a month or more before."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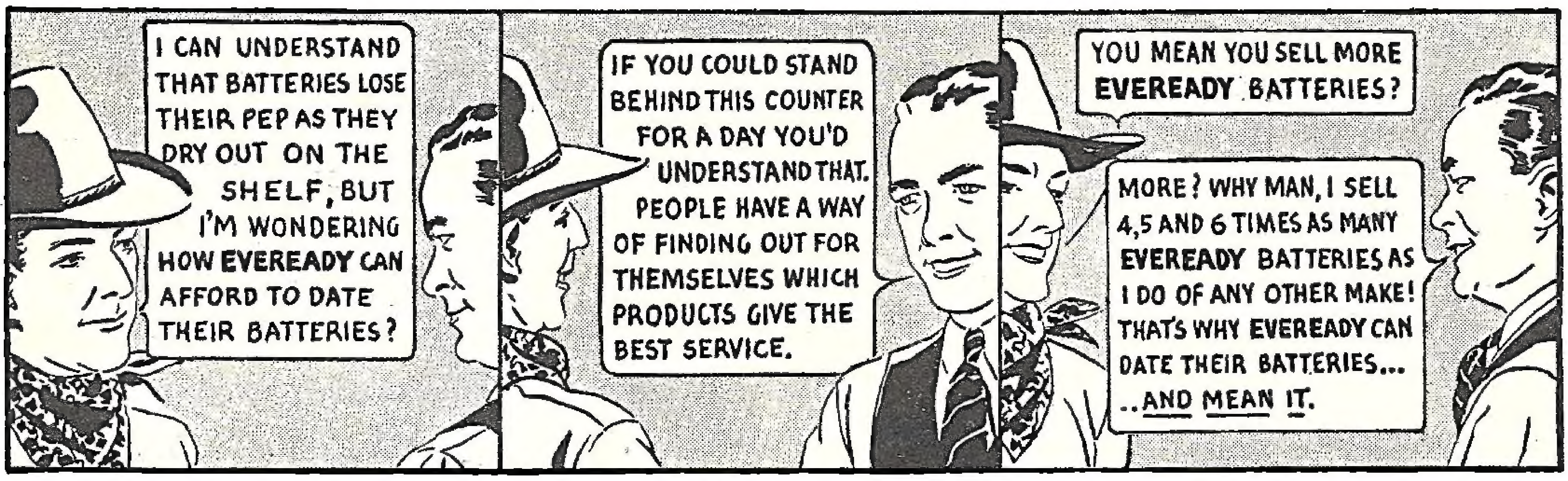
ONE REASON WHY THEY LAST LONGER

NATIONAL CARBON CO., INC., 30 East 42nd Street, New York, N.Y.


I CAN UNDERSTAND THAT BATTERIES LOSE THEIR PEP AS THEY DRY OUT ON THE SHELF, BUT I'M WONDERING HOW EVEREADY CAN AFFORD TO DATE THEIR BATTERIES?
IF YOU COULD STAND BEHIND THIS COUNTER FOR A DAY YOU'D UNDERSTAND THAT. PEOPLE HAVE A WAY OF FINDING OUT FOR THEMSELVES WHICH PRODUCTS GIVE THE BEST SERVICE.
YOU MEAN YOU SELL MORE EVEREADY BATTERIES?
MORE? WHY MAN, I SELL 4,5 AND 6 TIMES AS MANY EVEREADY BATTERIES AS I DO OF ANY OTHER MAKE! THAT'S WHY EVEREADY CAN DATE THEIR BATTERIES... ..AND MEAN IT.

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IN CANADA

MODERN MECHANIX
HOBBIES & INVENTIONS

JULY,
1936

Volume XVI
Number 3

CONTENTS

SPECIAL FEATURES

The Nation Sits In On National Conventions - - - - - - - 28
By Bob Gordon

New Twin Motor Stirs Aviation - - 32

Lighting The Way For Color Movies - 36
By Earl Thiesen

Found—King Solomon's Gold Mines - 40
By James Nevin Miller

England's Wonder Giant Puts To Sea - 46

Hidden Hazards of Circus Thrillers - 50
By Tom Murray

Win a Soapbox Racing Car! - - - 54

Brig. Gen. H. H. Arnold Surveys The Flying Game - - - - - - - 60

The Daredevil Dub-Menace of Auto Racing - - - - - - - - 64
By Fred Gilman Jopp

Splitting The Waves With The Outboard Racers - - - - - - - - 68
By David A. Brown

Outfitting For The Canoe Trip - - 74
By Robert Page Lincoln

Building Usefulness Into Your Neglected Basement - - - - - - - 80

Odd Instruments Win Fame For Major Bowes Amateurs - - - - - - 84

AUGUST! Lowell Thomas Writes of Reckless Pilots

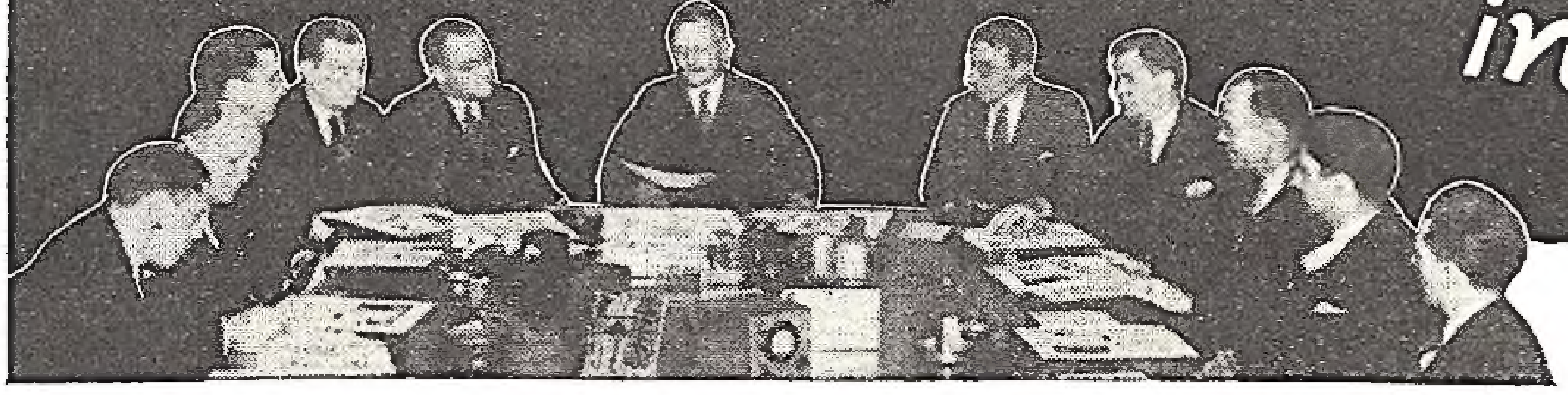
A new thrill for Modern Mechanix readers! Lowell Thomas, noted adventurer, writer and radio commentator, tells how the most courageous of fliers risk their lives in taking new and untried planes aloft. Watch for the title—"Test Pilots—Daring Challengers of Death." Don't fail to read it in the next issue.

SHORTER FEATURES

Nic Sprank - - - - - - 34
The Queen Mary Comes To America - - - - - - 45
Young Detective Smashes Police Ring - - - - - 53
Movie Cartoons Gain Third Dimension - - - - - - 59
Uncle Sam's Movies Record Army Life - - - - - 73
More Cash Prize Winners Announced In Needed Inventions Contest - - - - - 79
Housewives Welcome New Conveniences - - - - - 83

[*Continued on page* 8]

Train at Home...Under Factory Engineers for GOOD PAY Spare-Time and Full-Time Jobs in RADIO



LEARN TO EARN UP TO $75 A WEEK

(MANY R-T-I TRAINED MEN EARN MORE)

MAIL COUPON BELOW

APPOINTED BY RADIO MANUFACTURERS TO SUPERVISE R-T-I TRAINING

This is the R-T-I Advisory Board—Engineers and Executives of large Radio firms—appointed by these firms to supervise and direct R-T-I training. Put your future in their hands. 50 great radio manufacturers now endorse this Training.

RAY D. SMITH
President R-T-I, who has directed training of 100,000 men. Read what a few students say.

"Made my first spare time money after finishing four lessons. Over $500 spare time money in 10 months. R-T-I is O.K." Delmer Grote, Route 5, Greenville, Ohio.

* * *

"I made $14.25 in first 11 days of my training following your instructions." C. E. Head, 431 Third St., Alexandria, La.

* * *

"Before finishing my training I was made Manager of a Department Store's radio section." Howard N. Lentz, 123 W. Alexander St., Buchanan, Mich.

* * *

"My job paid me $18 a week before taking your training. Shortly after starting was averaging $60 a week. Have made as high as $250 in single week." Wm. T. Ridd, 3452 Evelyn St., Verdun, P. Q., Canada.

Trained Men Needed in All Branches

If you're dissatisfied with small pay—lay-offs and an uncertain future—here's an opportunity that's too good to miss. At the cost of only the time it takes you to mail the coupon you can get my big FREE book, "RADIO'S FUTURE AND YOURS." This book tells how you can **learn at home under the supervision of factory engineers, to make more money** almost at once in Radio—whether you want to make Radio your life's work, or use it to pick up an extra $5 to $20 a week in your spare time.

More Opportunities Than Ever Before

Radio is still forging ahead. **1935 was its biggest year.** Over 5 million new sets sold. Over 30 million dollars paid for service alone in 1935. Where only a few hundred men were employed a short time ago, thousands are employed today. And where a hundred jobs paid up to $75 a week—there are thousands of such jobs today—many paying even more. And new jobs are being created all the time—**full time jobs and spare time jobs.** Get my book and see how easy it it to learn at home for this good-pay work.

"Shop Training" for the Home

R-T-I Training is different than any training you ever heard about. It comes to you right from the heart of the Radio Industry—right out of the factories where Radio sets and other vacuum-tube devices are made. It was planned and prepared and is supervised by big radio engineers IN these factories—by men appointed for the purpose. This means that trained the R-T-I way, you'll be trained as the Radio Industry wants you trained—just as the Radio Industry, itself, would train you if it was doing the job.

Television, Photo Electric Cells, Public Address Systems Included

Radio service work is only the starting point in R-T-I Training. From there it will take you through the whole field of Radio and Electronics. You will learn about every new development, including Television so you'll be ready when Television breaks. You'll also learn the big money subjects such as Aviation and Auto Radio; Public Address Systems; how to handle Photo Cells; Sound Picture Recording, Etc.

4 Working Outfits Furnished

Start almost at once doing part time radio work. I furnish 4 outfits of apparatus that you build into test equipment with which you can do actual jobs and earn extra money. My Training pays its own way and you get your money back if not satisfied.

Age or Lack of Experience No Handicap

You don't have to be a high school graduate, nor even have finished the grades. My Training is so simple, easy, and practical, that the average man, regardless of age, education, or previous experience can master it. It offers the chance you have wanted to get out of a small-pay, no-future job, into good pay work with a future, in Radio and all its branches.

Get My Free Book

INVESTIGATE! Learn why R-T-I Training is different. Find out why R-T-I Trained men get "Quick Results" and "Big Results." Send for your copy of "Radio's Future and Yours" today. It tells you about Radio's amazing opportunities. It describes my approved training. It tells what R-T-I students are doing and making. It gives the names of my Advisory Board and 50 endorsing manufacturers. It's FREE. Clip, sign and mail coupon RIGHT NOW!

RAY D. SMITH, President

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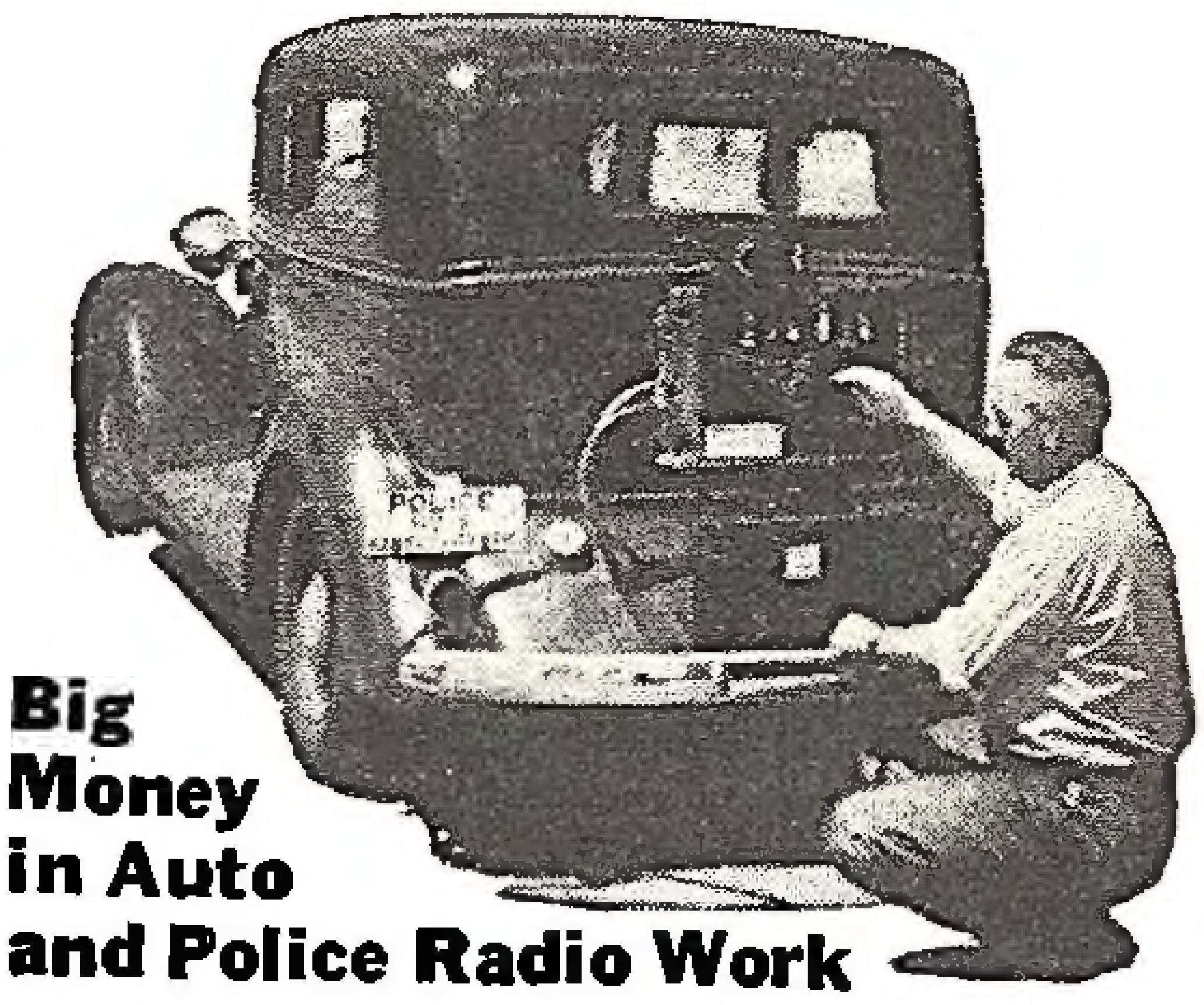
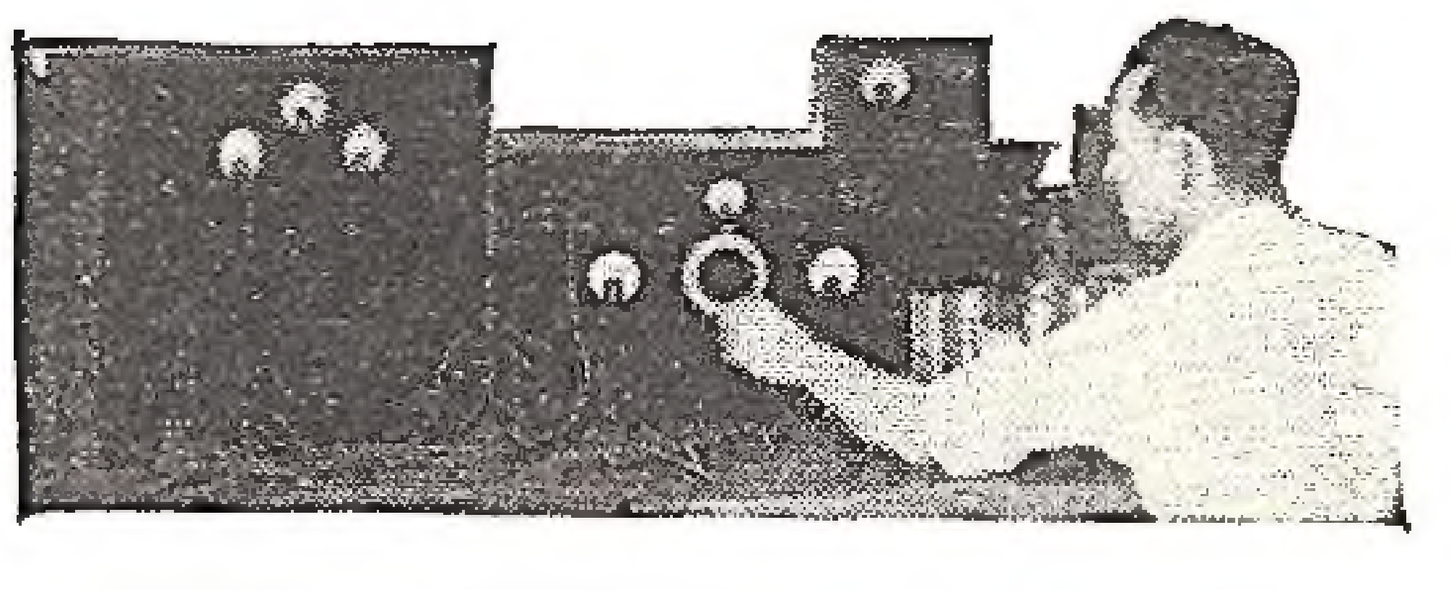


Big Money in Auto and Police Radio Work

W. H. Carr, 402 N. 16th St., Kansas City, Kansas, an R.T.I. student, has charge of 35 radio equipped cars for the Kansas City Police and Fire Departments. His salary is $230.00 a month and he is furnished with an automobile, gas, oil, etc. He says, "If I had not taken your course I would not be able to hold this job."



Makes $600 in One Month

Herbert B. Thompson, Gorman, Texas, formerly an oil well driller, borrowed $170.00 to start a spare time radio business after completing 12 R-T-I lessons. He made money from the start. In two years his shop was worth $3500. He says, "Because of my R-T-I Training I made $450 in September and over $600 in October, 1935. It pays to be R-T-I Trained."

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A frank man to PATENTS-INVENTIONS

THE world of invention moves on. The Patent Office clerk who resigned his job back in 1833, because he said there was nothing left to invent, now stands out as one of the funniest men in American History. Think of everything that's happened in the last 100 years! Why, only recently the papers carried a notice that an obscure worker, Hans Wach, has invented a simple device to utilize exhaust steam on steam boats. *Already, the report states, the steam ship lines have saved more than $15,000,000 in fuel bills with his invention.* Almost in the same breath the Dept. of Commerce announces that it will soon test out a new non-crashable aeroplane, which the average man can learn to fly in a day, which will travel at 110 miles an hour and sell at the price of a cheap automobile. An unknown Seattle man has invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

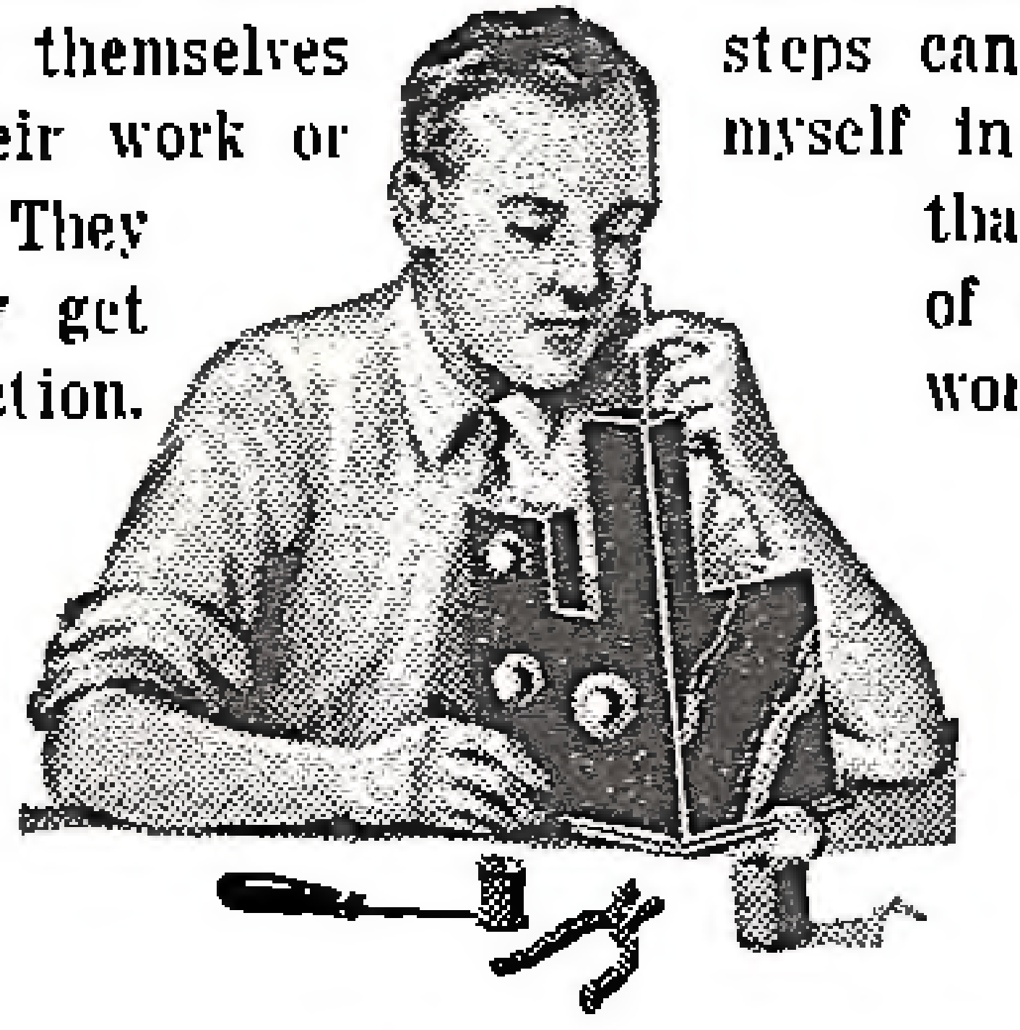
Remember this: For every outstanding big invention there are thousands of small, simple things for use in the home, the office, the factory, on the farm, on every sort of travel conveyance. Little articles like you find on the counters of a 10-cent store, hardware store, drug store, toy and novelty shop.

Many Little Ideas Have Big Commercial Possibilities

A person finds something he's using doesn't work right, or it's clumsy, or costs too much. He gets a happy thought. He improves the old Article. That's contribution to human progress. That's the way that many, many men have reached the goal of financial comfort, independence and even wealth. Most of the things millions of us use didn't come from the brains of engineers and physicists. They came from the mind and maybe the crude home work bench of Mr. Average Man, busily engaged in earning his bread and butter at whatever chance or circumstance has given him to do. The "little" man's opportunity as an inventor was never greater than it is today.

Who Are Inventors?

You'd be amazed at the men we contact in the course of a busy year. Most of them do not consider themselves inventors at all. During their work or leisure they get an idea. They work it out on paper. They get in touch with us about Protection. Did you know that a dentist invented the stock ticker, a school teacher the telephone, a farmer the typewriter, an artist the telegraph? Did you know that the crinkly hair pin—sold by millions now—came about because a husband saw his wife twisting the old-fashioned straight hair pin to make it stay in place? **Poor men who have no thought of invention now will be financially well-fixed in a few years because of a happy thought that the world could use to advantage.**



Can You Answer These Questions?

Ask yourself these questions: How do the Patent Laws protect me? What easy steps can I take, without cost, to put myself in position to support my belief that I am the *first* man to think of *my invention*? Is a Patent worth the cost? Do I need a model? Should I try to sell my invention before I have it Patented? Is there any safe, business-like way to secure financial help? If I do apply for a Patent how shall I reach people who can market my invention? Can I protect and sell an improvement on some invention that has already been patented? These are but a few of the questions which usually confront the average man. You need the answers! **YOU CAN HAVE THEM,** without cost, trouble, or delay.

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For more than thirty-six years, this firm has been helping men with an inventive turn of mind. We maintain a large staff of trained, experienced specialists—**Registered Patent Attorneys, Draftsmen, and Searchers to help our clients secure all the protection to which they are entitled.** Fees are reasonable. Deferred payments frequently arranged. Questions promptly answered. Write us frankly with absolute assurance that what you say will be treated with strictest secrecy. **But FIRST, send for the FREE BOOKS shown on the opposite page.** They are filled with facts, pictures and suggestions. They tell you things about Patents, Inventions and Selling Inventions that we have learned in our long experience. **They may save you time, expense, EVEN LATER DISAPPOINTMENT. Simply** fill in the coupon. **No charge, no obligation.** Write us today.

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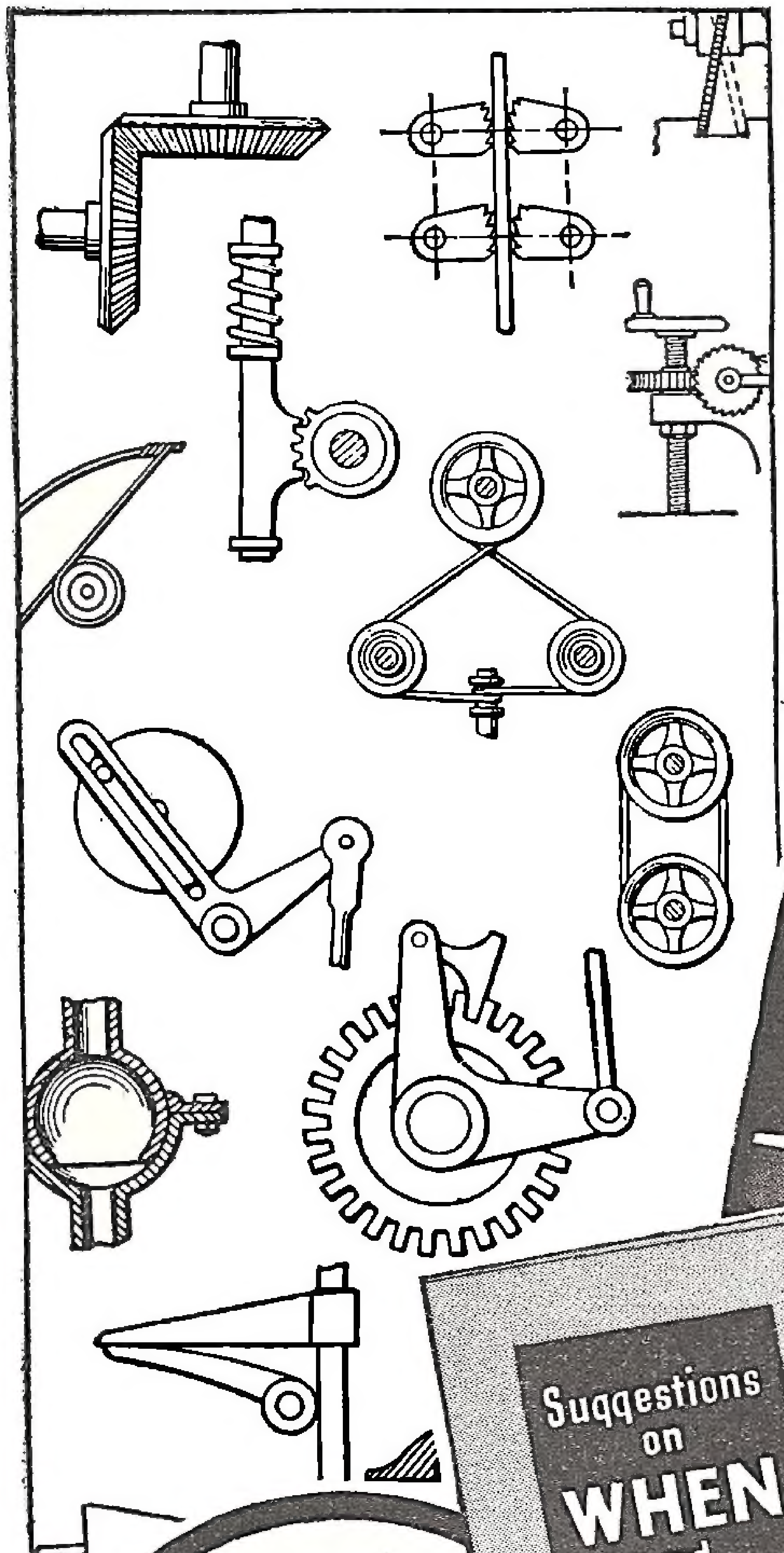

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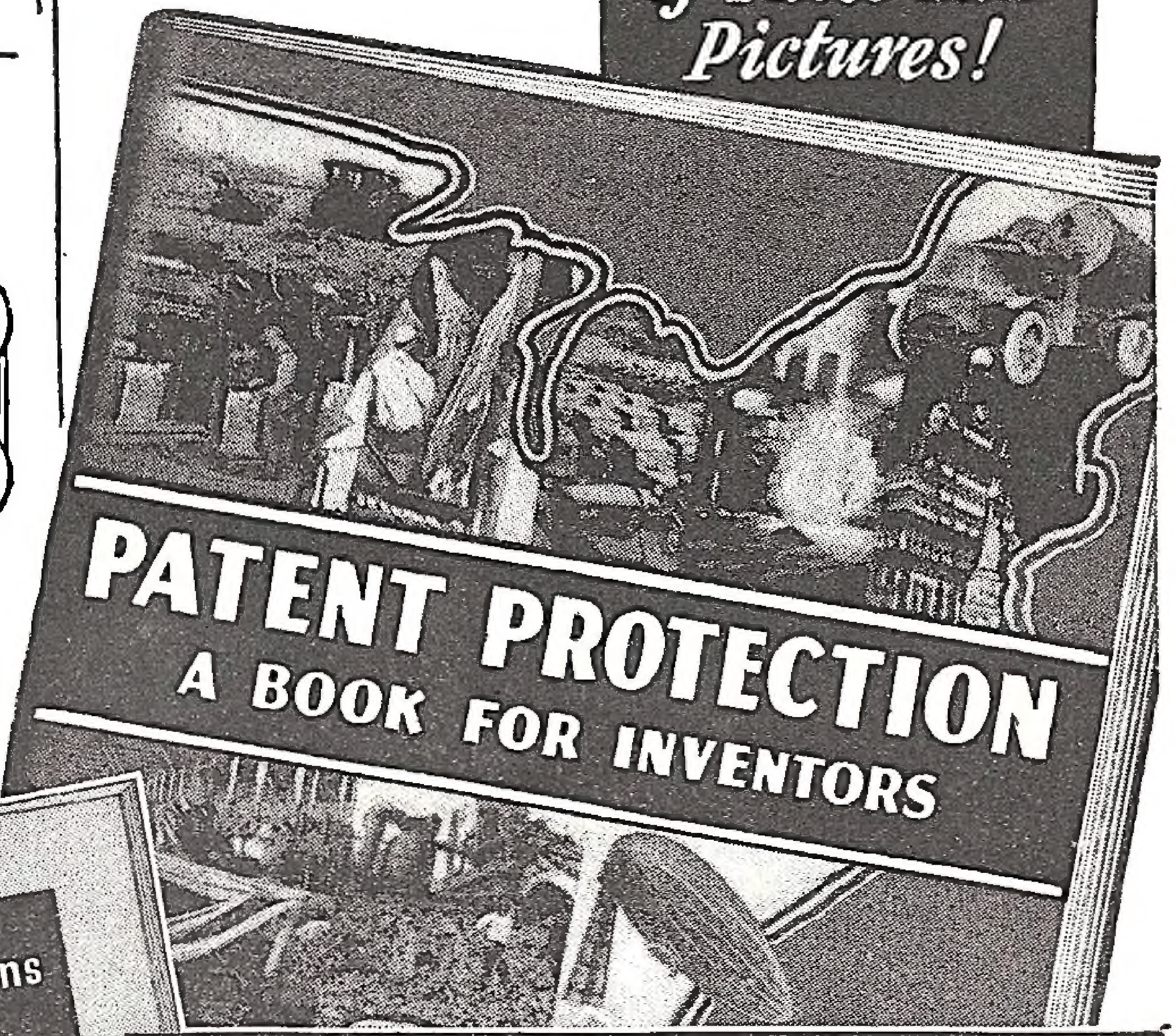
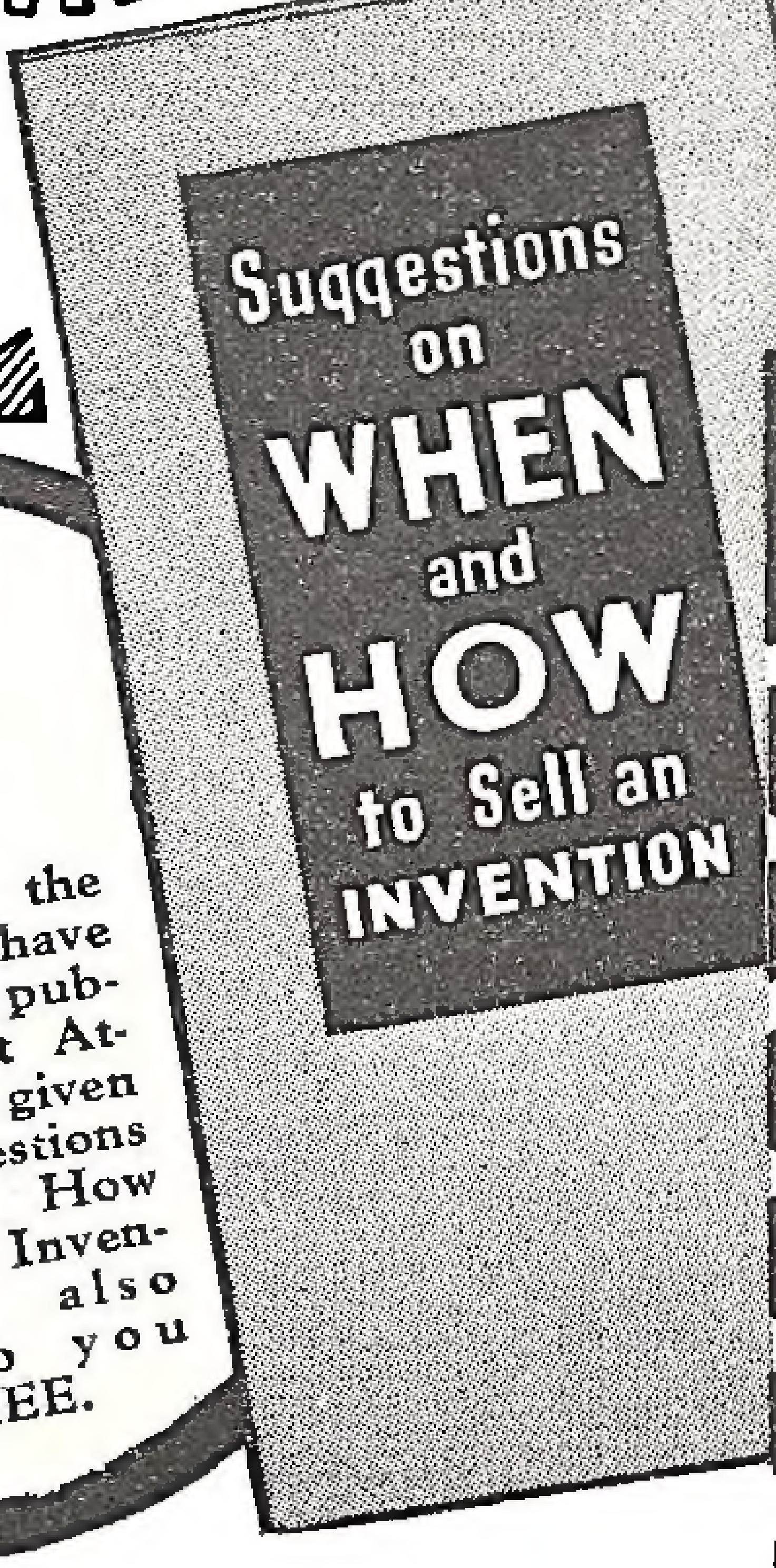


PATENT PROTECTION
A BOOK FOR INVENTORS



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CONTENTS—Continued from page 4

Architect Builds New Home In Glass - - 87
Making the World's Largest Photographs - 89

HOW-TO-BUILD FEATURES

"Sunbeam"—a Flashing Model Raceboat - 90
A Home Air Conditioner You Can Make - 95
Surfboards For Summer Sport - - - - 99
Build "Handy Henry" Tractor For Twenty Dollars - - - - - - - - - - - - 100
Tips For Motorcyclists - - - - - - - - 103
"Crystaldyne" A Cigar Box Receiver - - 106
A Novel Sword and Shield Sundial - - - 107
A Treadle Operated Swing For The Lawn - 109
Paint Wisely and Save Money - - - - - 110
Making Novelty Jewelry At Home - - - 113

NEW MECHANICAL INVENTIONS

Scrap Iron Pays For Political Race - - - 30
Radio Waves Piped In Tube - - - - - 31
Flying Wings Is Model For Liner - - - 31
Camera Takes 5,000 Pictures A Minute - 35
Flicker Bulb Is Self-contained - - - - 35
Amphibian Sets Two Altitude Marks - - 39
Small Arc Welder Handles Big Jobs - - 39
"Whippet" Boats Guard Europe's Seas - - 44
Modern School Built Of Glass Bricks - - 44
Motor Truck Delivers Rail Shipments - - 49
Radio Station Built In Top Hat - - - - 49
New Bus Features Aluminum Body - - 49
Electric Eye Judges Races - - - - - 52
Tickets Printed On Midget Press - - - - 52
Robot Synchronizes Plane Motors - - - 52
Rocket Blast Launches Lifeboat - - - - 58
Sootless Cook Stove Burns Sawdust - - - 58
"Family Bus" Carries 11 Passengers - - 58
Plane Claimed Cleanest In Design - - - 62
Canoe, Bicycle Fold For Traveling - - - 62
Giro Plane Flies Without Propeller - - - 63
Athlete Invents Novel Land Canoe - - - 63
Light Beams Boon To Aviation - - - - 67
Robot Develops Film Uniformly - - - - 67
Radio Listens In On Phone Calls - - - - 67
Sound Truck Records Street Comments - - 71
Eye-Glasses Double For Microscope - - 71
Camera Boasts Fast, Adjustable Lens - - 72
Electric Iron Sprinkles Clothes - - - - 72
French Car Boasts Automatic Top - - - 76
Machine Heats Or Cools Sky Liners - - - 76
Flexible Axle Truck Rolls Over Rough Roads 77
Odd Motorcycle Puzzles Parisians - - - 77
Huge Spray Used To Color Pottery - - - 77
Bicycle Without Pedals Gains Public Fancy 78
Machine Makes Issuing Checks Easy - - 78
German Mail Bus Placed In Service - - - 78
Minnesota Bridge Has Circular Ramp - - 82
Fire Ladder Rises 164 Feet - - - - - 82
Mystery Plane Aims At New Record - - 86
Lathe Combines Beauty With Utility - - 86

[*Continued on page 12*]

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Everyone wants additional tools for his shop. High cost patterns made this impossible in the past. NOW there is a New Deal for the hobbyist. We have engineered the most needed tools and are offering castings and blueprints of them. No chance of mistakes because all detail drawings are half or full scale. Every item designed for complete and trouble-proof construction in school or home. You can build them for your own shop or for re-sale at attractive profits.

NO WORRIES ABOUT QUALITY

Quality and design of our castings are so perfect that your first order will make you a life-long customer. Only perfectly-designed castings are good enough for you — and for us. When you order, you **know** that you will get materials worthy of your skill and time. To maintain our leadership we must continue to sell only the best. We are absolutely pledged to this policy.

MAKE YOUR SHOP PAY DIVIDENDS

Why not let your shop pay for itself and then earn a profit? A year ago one customer had only a small lathe and drill. Now he has a shop full of machinery valued at $4000. He did it by selling finished machines built from our castings.

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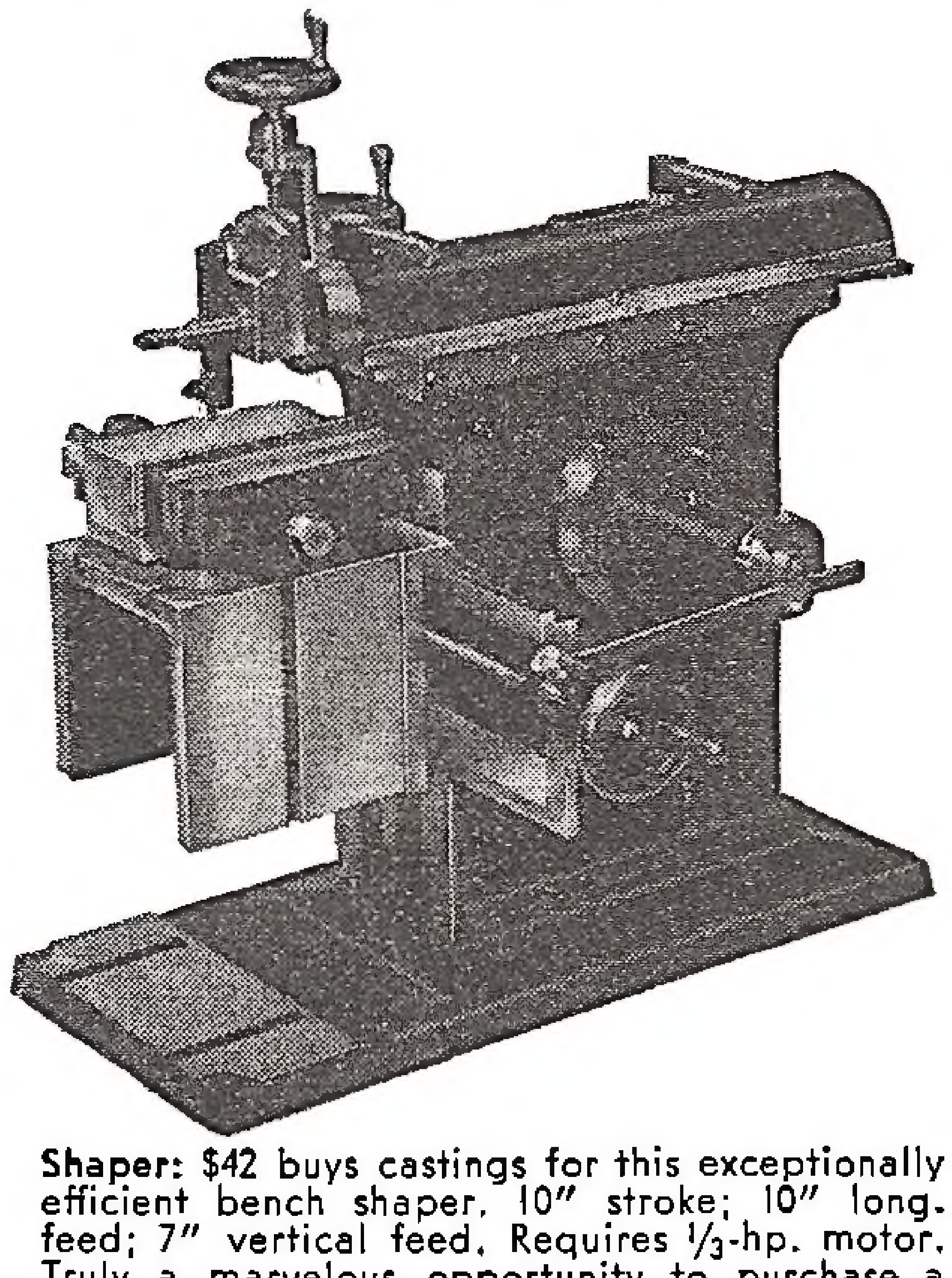

Shaper: $42 buys castings for this exceptionally efficient bench shaper. 10" stroke; 10" long. feed; 7" vertical feed. Requires 1/3-hp. motor. Truly a marvelous opportunity to purchase a $500 machine at less than 1/10 of its assembled value.

Machine Vise — 7", swivel base, semi-steel, heavy design. Although a very easy tool to build, this vise has a place in every shop. You save over $16.00 by building it in 7 or 8 hours of your spare time. Castings and materials **$4.95**

Bench Vise — 4". No shop is complete without a vise. Why spend $10.00 or more? Castings and material, including bronze nut, only **$4.80**. Can be finished in three or four hours.

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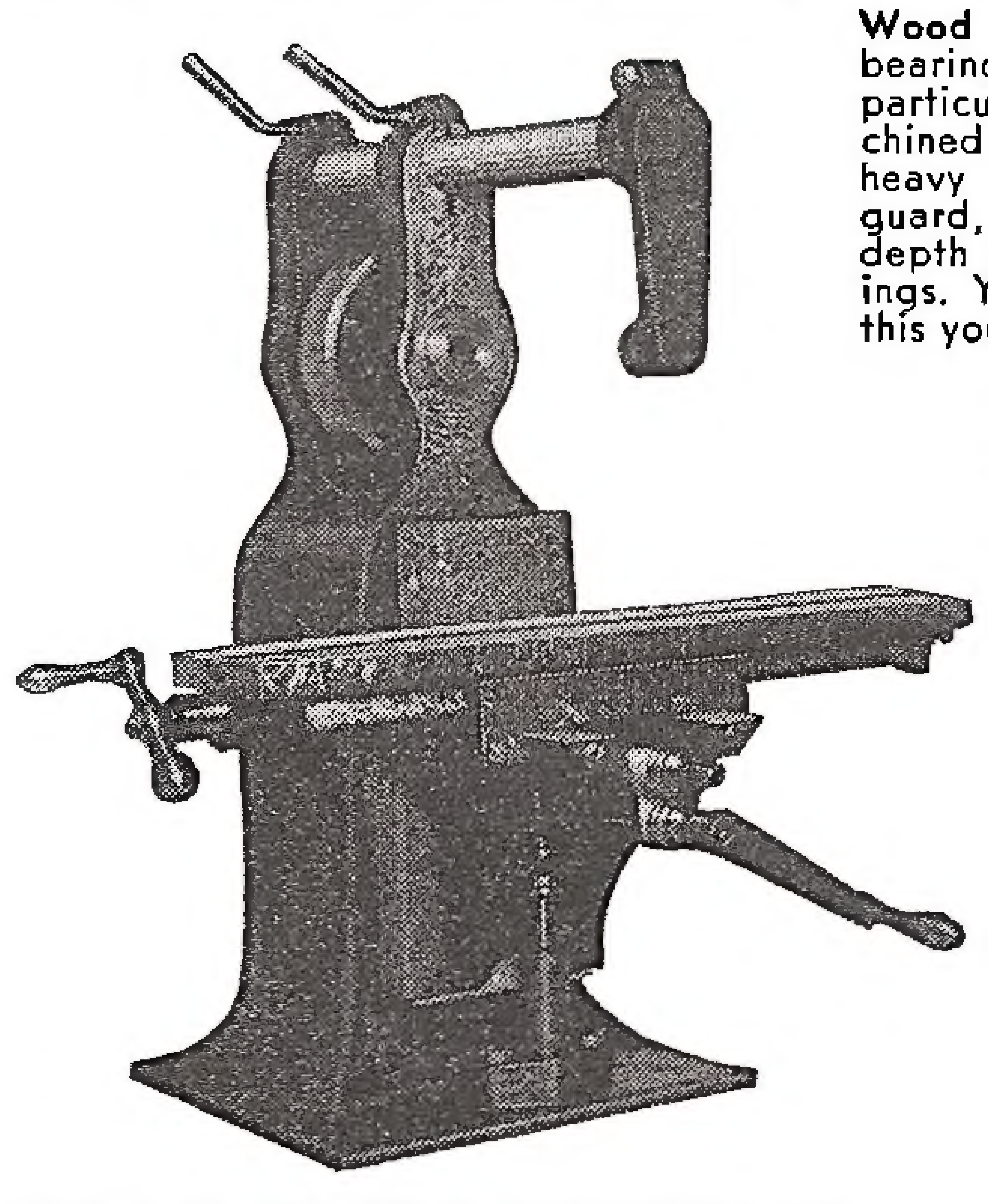

Milling Machine: $29.50 buys castings and materials. 12" long. feed; 5" traverse feed; 8" vertical feed. Requires 1/4-hp. motor. If your equipment is limited, you can buy this mill semi-machined, with all major machining already done . . . including facing, boring, dovetailing, slotting, and T-slotting. You can easily complete the job with 8" lathe and drill. Write for further information and prices.

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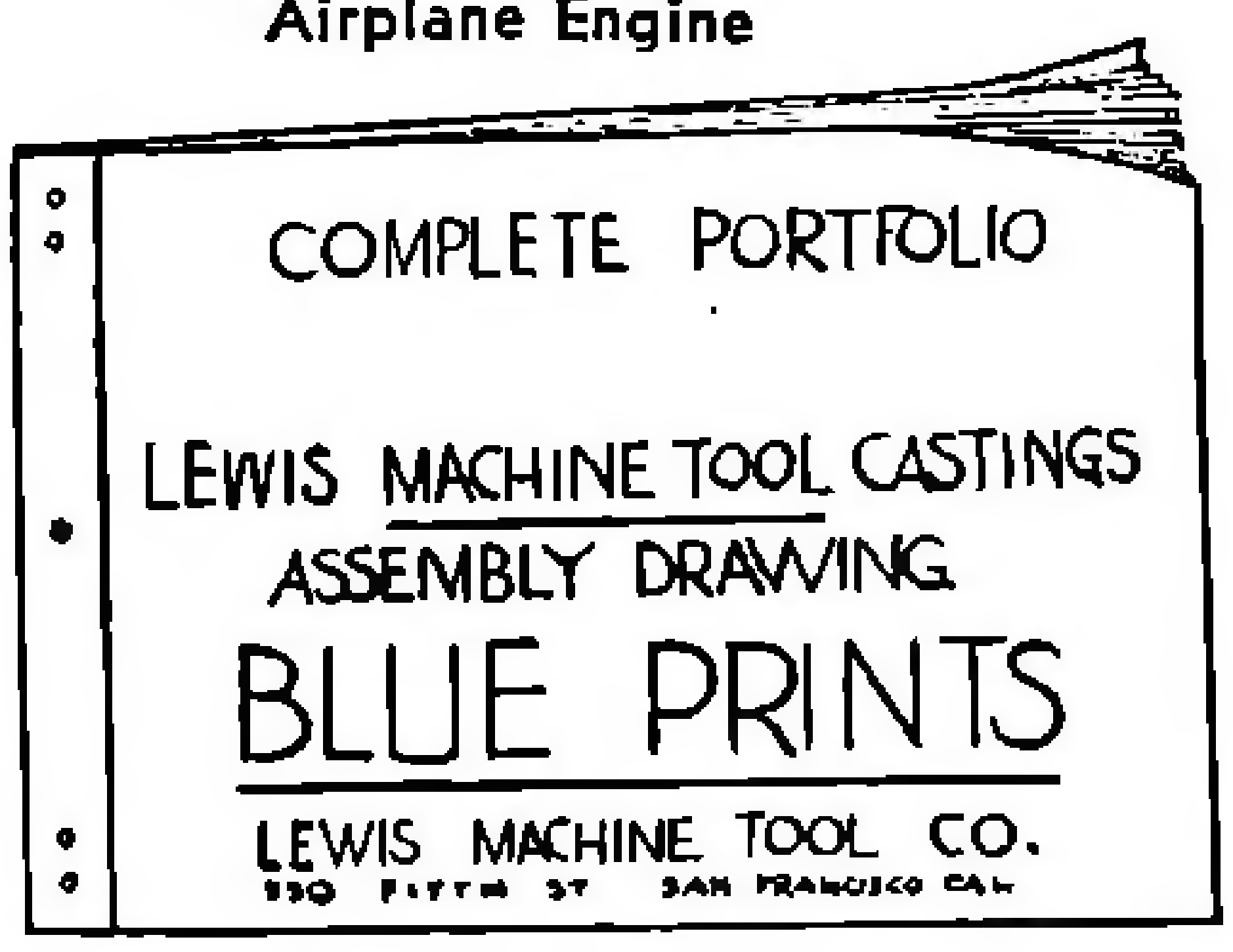

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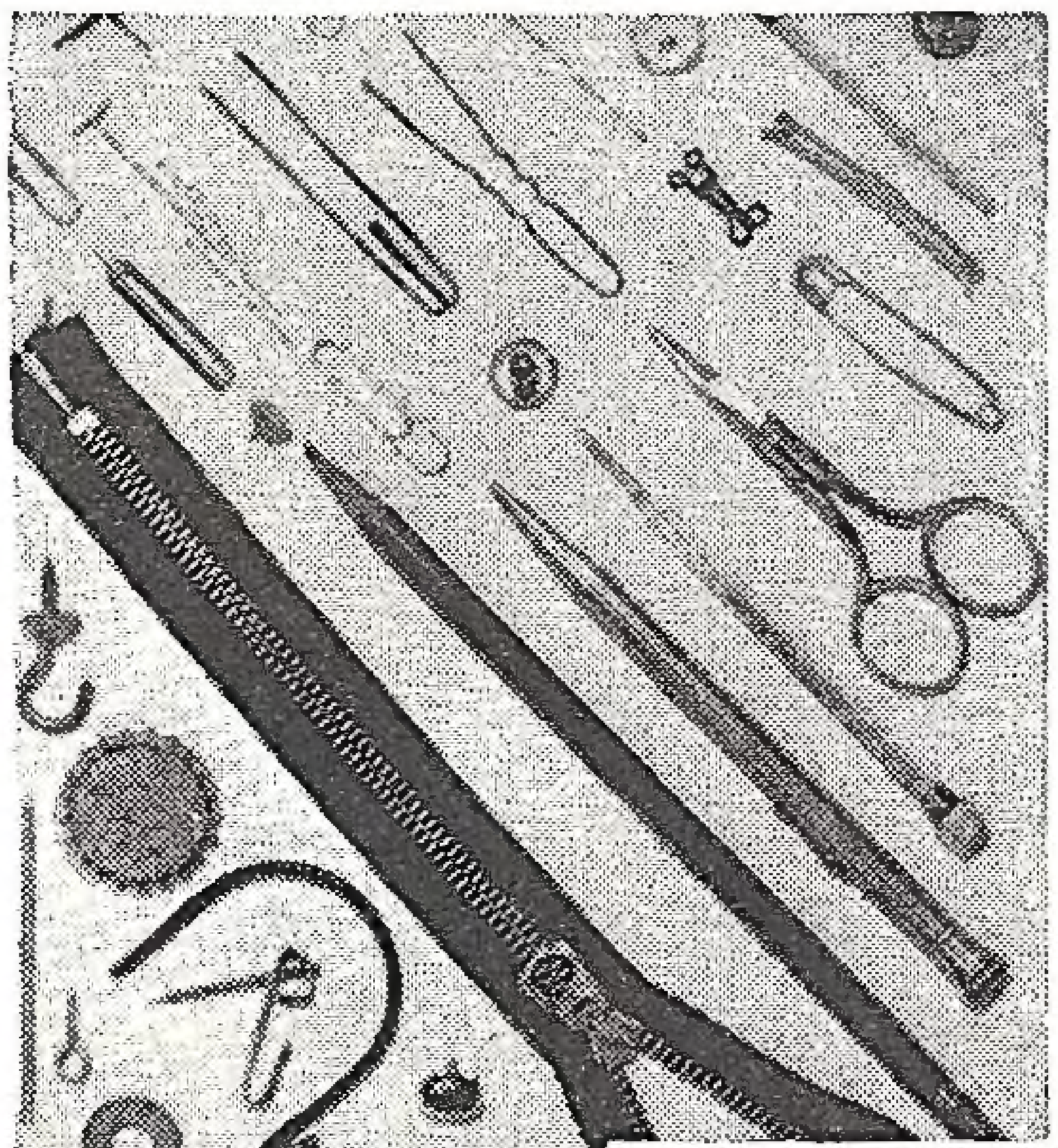

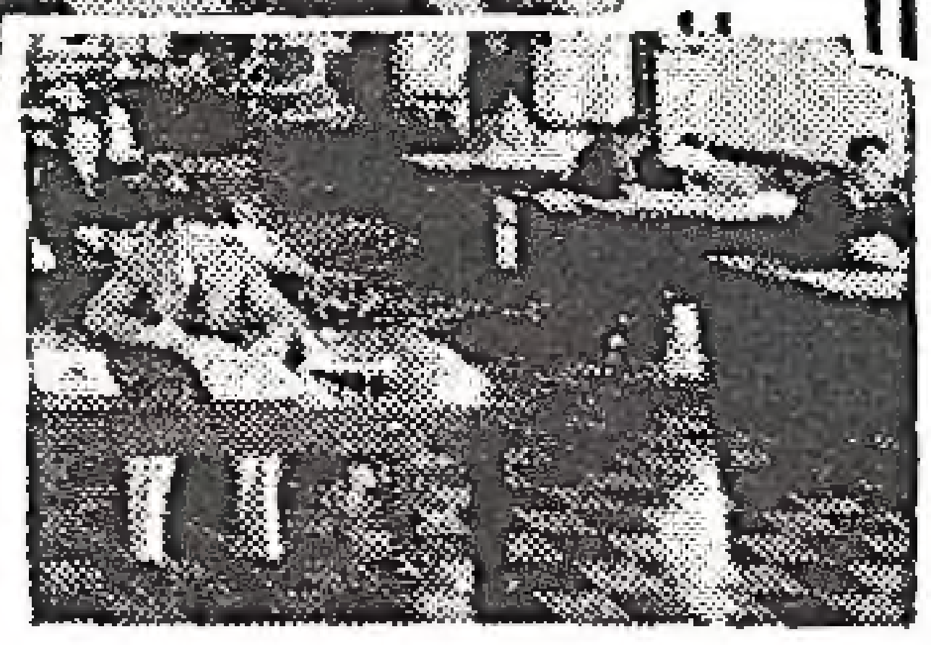

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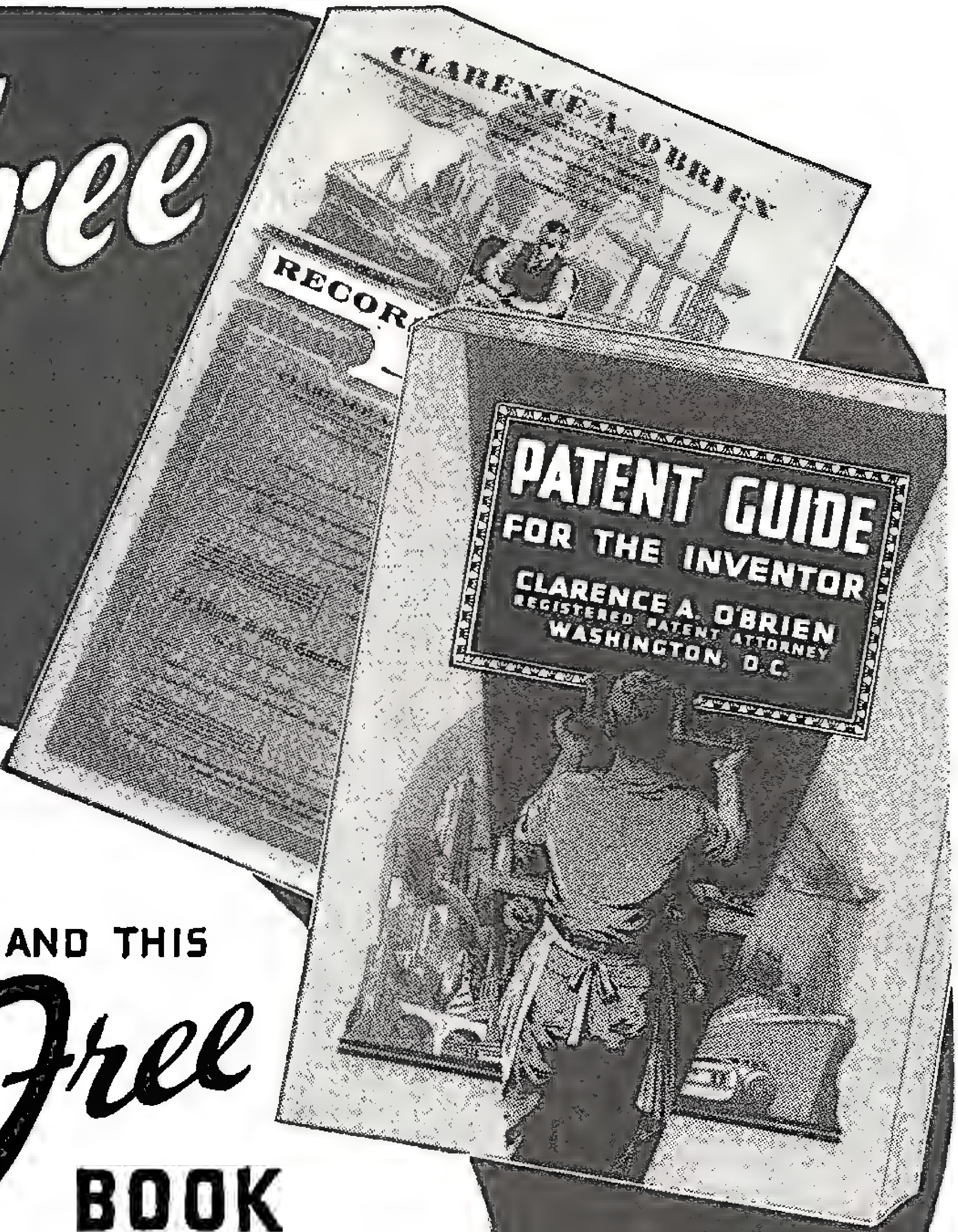

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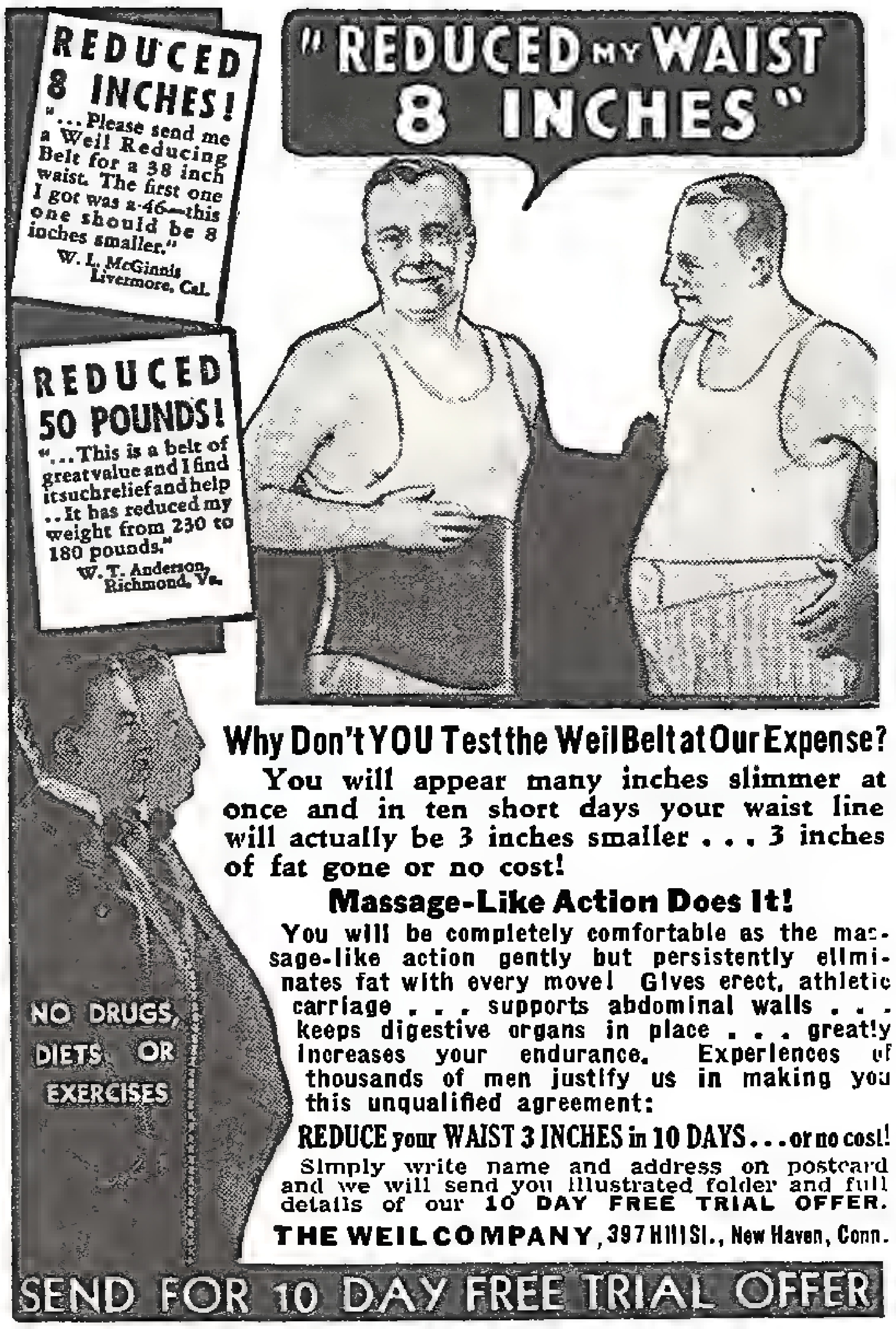

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CONTENTS—Continued from page 8

New Rod and Grip Aid Fisherman - - - 86
Small Porcelain Base Supports Radio Tower 88
Automatic Glass Washer Patented - - - 88
Robot Listeners Check Broadcasts - - - 88
Dash Lamp Warns of Light Failure - - - 88

INTERESTING SCIENTIFIC ITEMS

Capt. Eyston Sets Racing Record - - - 35
Giant Cameras To Photograph Sun's Eclipse 39
Diamond Cut To Make $2,000,000 Necklace - 44
Chef Fashions Caricatures In Toast - - - 62
Device Measures Body Heat Of Bees - - 63
Big Tank Floated To New Location - - - 71
Film To Record Perfect Voice Pattern - - 72
Garden Thrives On Chemical Soil - - - 76
New Process Turns Out Clean Dirt - - - 82

FOR THE WORKSHOP FAN

Short Cuts For The Shop Man - - - - 94
Attractive Lamp Turned From Plywood - 98
A Stamp Projector For Hobbyists - - - 98
Summer Suggestions For Motorists - - - 102
Moisture Gauge Measures Humidity - - 104
Jumping Plug Puzzles Party Guests - - - 104
Helpful Tips For Fishermen - - - - - 108
Ideas For Use About The Home - - - - 112
Combination Door Adds To Home Convenience - - - - - - - - - - 114
Fruit Jar Makes Decorative Lantern - - 114

DEPARTMENTS

Solving The Readers Problems - - - - 14
Random Chips From The Editor's Workbench - - - - - - - - - - - 20
Nic Sprank - - - - - - - - - - - - 34
Sportsman's Campfire - - - - - - - - 74
Radio Sparks - - - - - - - - - - - 105
Camera Puzzlers - - - - - - - - - - 116
New Business Ideas - - - - - - - - 143

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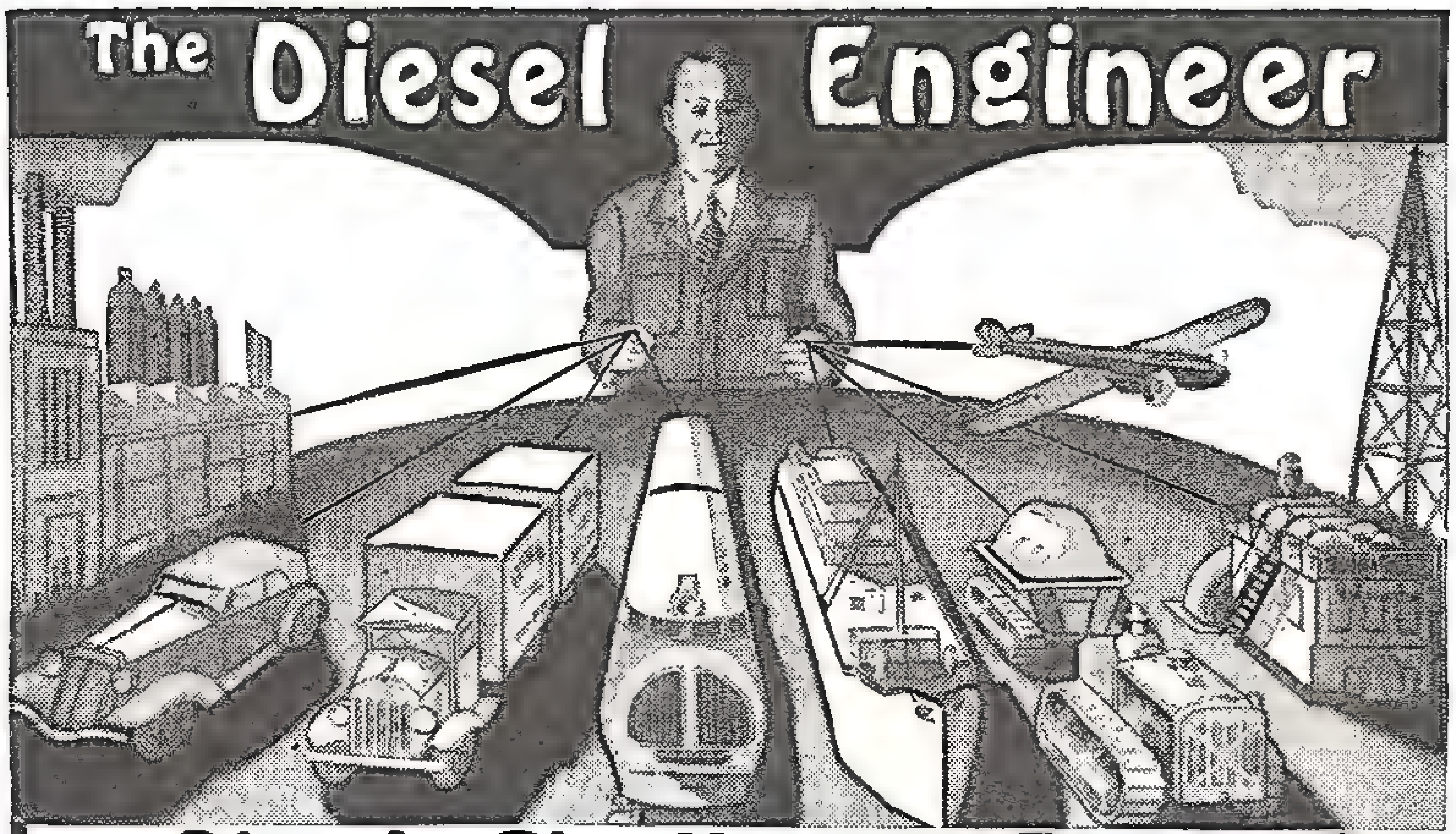

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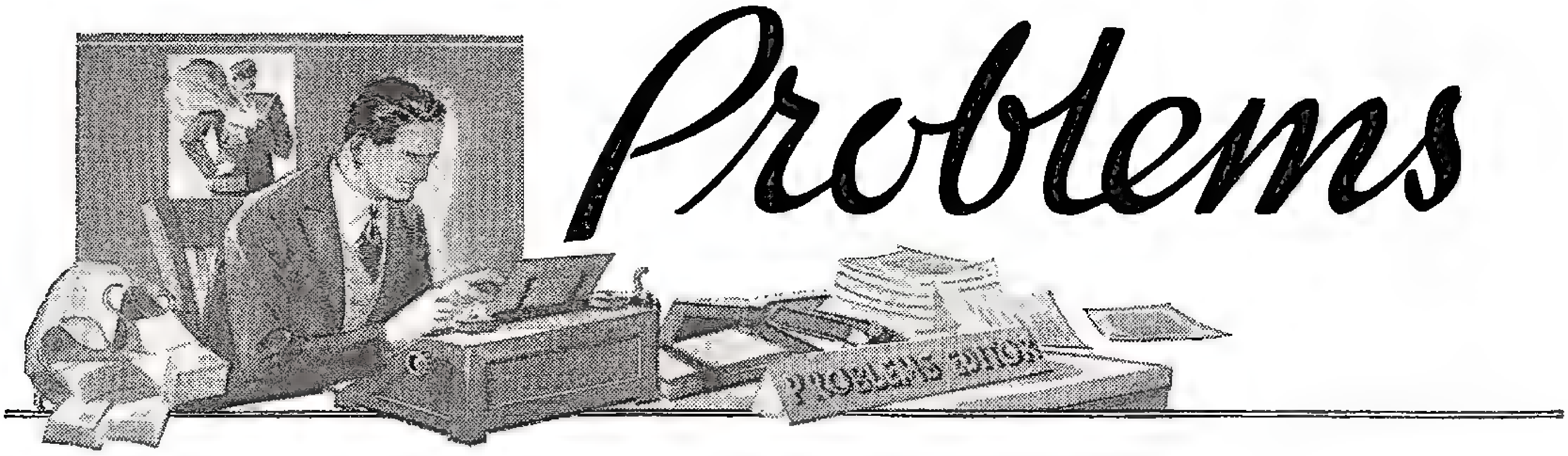


M M EDITORS ANSWER Perplexing READER PROBLEMS

CHINOOK CYLINDER WALL THICKNESS

"Chinook," the model gasoline engine described in the May issue of MM was one of the most interesting projects to appear in its pages. Since I hope to build "Chinook" shortly I would appreciate knowing the thickness of the cylinder walls.—J. G., Wheeling, W. Va.

In constructing the cylinder make the walls one-sixteenth of one inch thick. "Chinook" blueprints are now available through the MM Blueprint Dept. at 50c postpaid.

COUPLING TRAILER TO THE AUTO

I recently purchased a 1936 model automobile and find that it is impossible to connect my trailer to the car's bumper as I did with my traded-in car. Can you advise a satisfactory method for coupling the trailer?—T. A. L., Washington, D. C.

At no time should a trailer be attached to a makeshift coupling device on the rear bumper of a car. Such an arrangement is not only dangerous but poor practice. A commercial trailer hook, similar to those advertised in MM from time to time, is required. A coupling of this type connects directly to the frame of the car. Due to the low cost of good couplers it is inadvisable to attempt to make your own. In attaching a trailer to your car chains should also be used as a safety measure.

INCREASING LIFE OF ELASTIC MOTOR

The rubber band motor which drives my three-foot model plane is constantly breaking. At first I thought this was due to stale rubber, but find that new rubber is no better. Can the rubber motor be lubricated with some solution so as to increase the life of the elastic?—E. J. L., Dallas, Texas.

The continued breaking of rubber bands used to power your model plane may be traced to the propeller shaft hook or the hook in the tail of the plane to which the elastic is attached. Small gauge piano wire is usually used for this purpose and the sharp edges cut the cord. By slipping short lengths of rubber tubing over these hooks and lubricating the elastic with glycerine the life of the rubber band motor will be increased greatly.

GENERATOR FAILS TO CHARGE PROPERLY

I have noticed that while driving my car the battery does not receive a uniform charging rate. Sometimes the rate is five amperes while at other times it is ten. Since I do quite a bit of night driving the battery has little chance to secure a sufficient charge. Many of my friends have experienced similar trouble. Are you in a position to suggest a method for correcting this trouble?—E. R., Omaha, Nebr.

If your generator does not produce a uniform charge it is due to a faulty cut-out or worn brushes. Replace the old brushes with new ones then clean the commutator with gasoline. Carefully check the cut-out for stuck contact points and replace this unit if necessary. If the generator charging rate is too low it can be increased by advancing the position of the variable brush on the commutator.

USING MIDGET A. C. SET IN AUTO

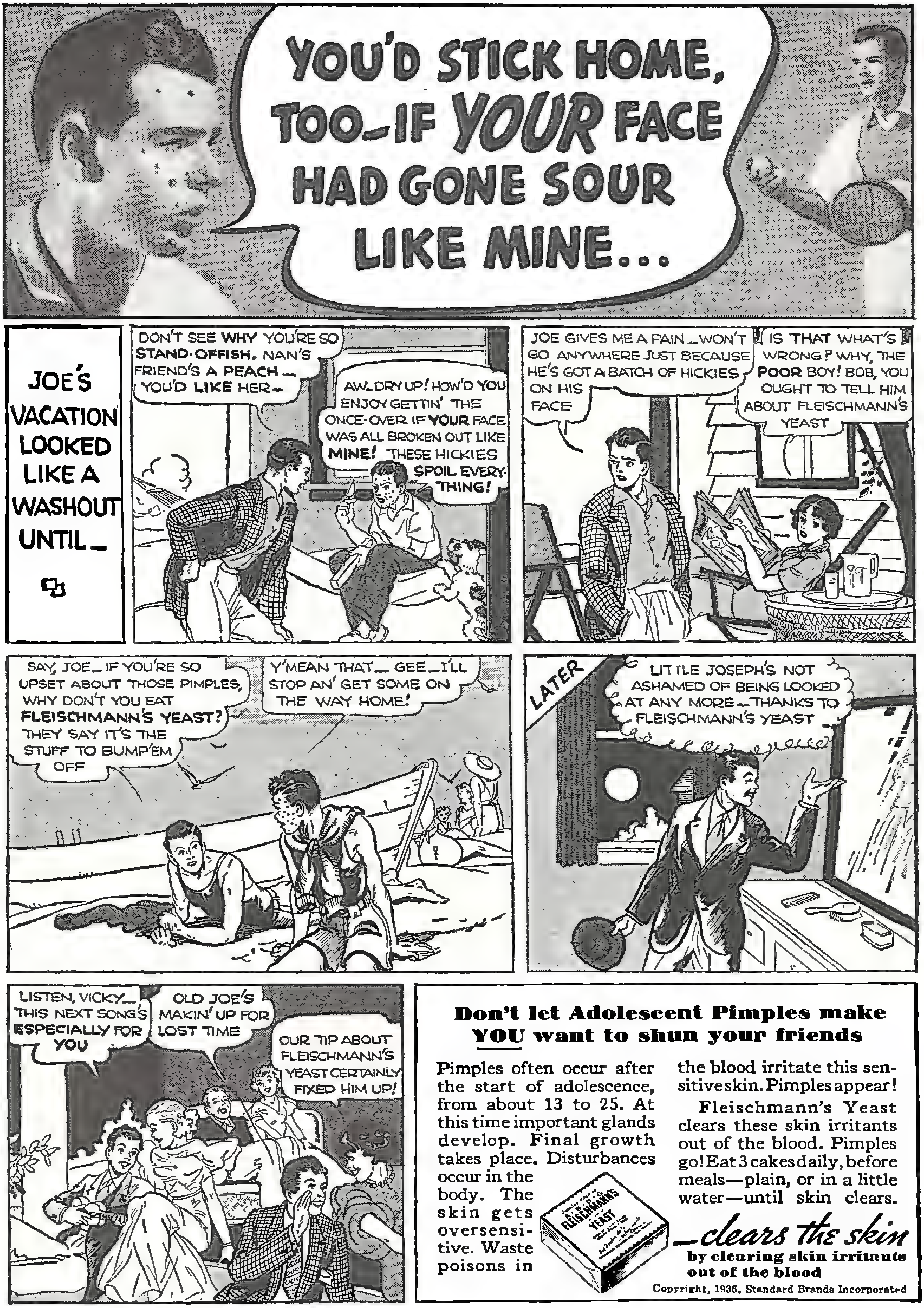
I have a 4-tube midget electric radio and I should very much like to use it in my car. Isn't it possible for me to connect a B unit to it and get satisfactory results?—G. R. M., Waterbury, Conn.

To use a set of this kind in your auto will require the filament circuit being rewired. Since motor ignition noises will be present the set will also have to be thoroughly shielded. Most midget sets have only three active tubes which is insufficient for auto use. We don't advise the change.

A LUBRICANT FOR AUTOMOBILE SQUEAKS

My car has developed squeaks in several places and while the regular pressure lubrication does silence the noise for a few days its effect is by no

[*Continued on page* 16]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DON'T SEE WHY YOU'RE SO STAND-OFFISH. NAN'S FRIEND'S A PEACH — YOU'D LIKE HER—
AW—DRY UP! HOW'D YOU ENJOY GETTIN' THE ONCE-OVER IF YOUR FACE WAS ALL BROKEN OUT LIKE MINE! THESE HICKIES SPOIL EVERYTHING!
JOE GIVES ME A PAIN — WON'T GO ANYWHERE JUST BECAUSE HE'S GOT A BATCH OF HICKIES ON HIS FACE
IS THAT WHAT'S WRONG? WHY, THE POOR BOY! BOB, YOU OUGHT TO TELL HIM ABOUT FLEISCHMANN'S YEAST
SAY, JOE— IF YOU'RE SO UPSET ABOUT THOSE PIMPLES, WHY DON'T YOU EAT FLEISCHMANN'S YEAST? THEY SAY IT'S THE STUFF TO BUMP 'EM OFF
Y'MEAN THAT— GEE—I'LL STOP AN' GET SOME ON THE WAY HOME!
LATER
LITTLE JOSEPH'S NOT ASHAMED OF BEING LOOKED AT ANY MORE—THANKS TO FLEISCHMANN'S YEAST
LISTEN, VICKY— THIS NEXT SONG'S ESPECIALLY FOR YOU
OLD JOE'S MAKIN' UP FOR LOST TIME
OUR TIP ABOUT FLEISCHMANN'S YEAST CERTAINLY FIXED HIM UP!
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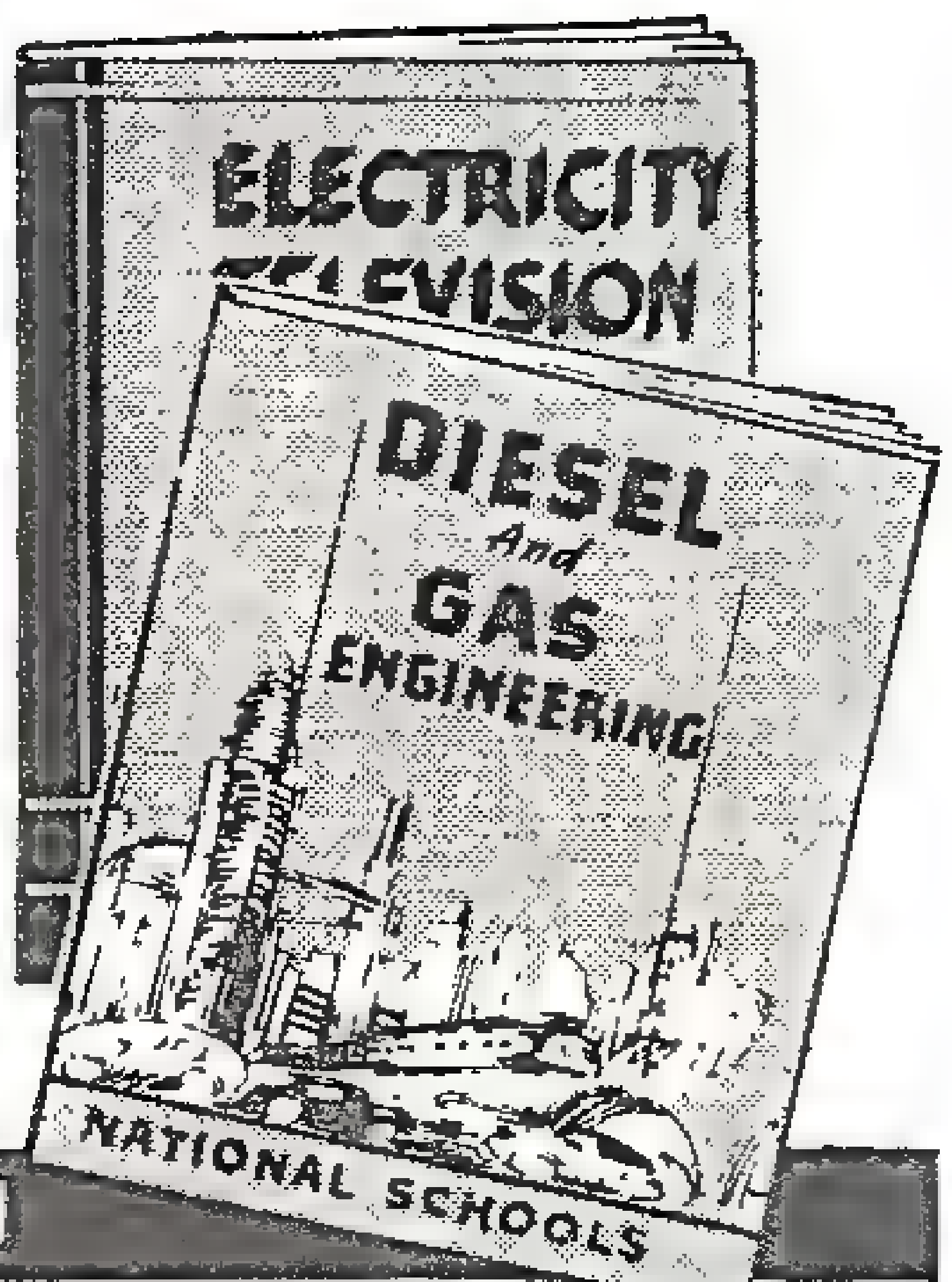

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Problems Editor Answers Queries

[*Continued from page* 14]

means permanent. Can you suggest a method for correcting this trouble?—L. T. N., Denver, Colo.

On shackles and similar parts exposed to the elements the grease is rapidly dried up and washed away when the car is driven during a rainy spell. The most effective way to correct stubborn squeaks is to apply stick graphite to the source of the noise. If possible pins or bolts holding the shackle should be removed and the graphite rubbed on well. The graphite may also be applied to door hinges and other small moving parts where annoying squeaks develop.

KILLING WEEDS IN WALKWAY

We recently constructed a gravel walkway on our lawn and while a grass strip was removed before putting down the stones weeds continually shoot up through them. Can you recommend some common chemical which will kill this unwanted wild grass?—R. P., Portsmouth, Va.

Wild grass or common weeds can be killed by applying a copper sulphate solution to the ground where the trouble exists. The copper sulphate, commonly known as "Bluestone" is dissolved in water, one pound to each gallon. It should be remembered that where the solution has been applied no vegetation will grow.

METAL OR GLASS TUBES?

My radio receiver is equipped with glass tubes and performs very well. Several of my friends have receivers which employ the new metal types. Are these tubes superior to those in my set?—E. M. M., Danville, Va.

While there is no noticeable difference in the performance of the radio receiver using glass tubes and one using the metal types, the metal tube offers several mechanical advantages. Since the tube is a shield in itself the usual metal shields found on glass tube receivers are not necessary. The metal tube employs a uniform socket so that all tubes have an eight-prong base. A special pin in the center of the tube base permits the tube to be inserted into the socket in a fraction of the time required for the glass types. Another advantage offered by the metal tube is that its electrical characteristics make it ideal for use in modern high gain receivers.

(Editor's Note: Your questions will be answered personally and free of charge by MM experts provided they do not require special research or involve trade secrets. Names and addresses of manufacturers of new products described in this issue can also be obtained free upon request. Enclose a self-addressed and stamped envelope for reply. Address: Problems Editor, Modern Mechanix Publishing Co., Greenwich, Conn.)

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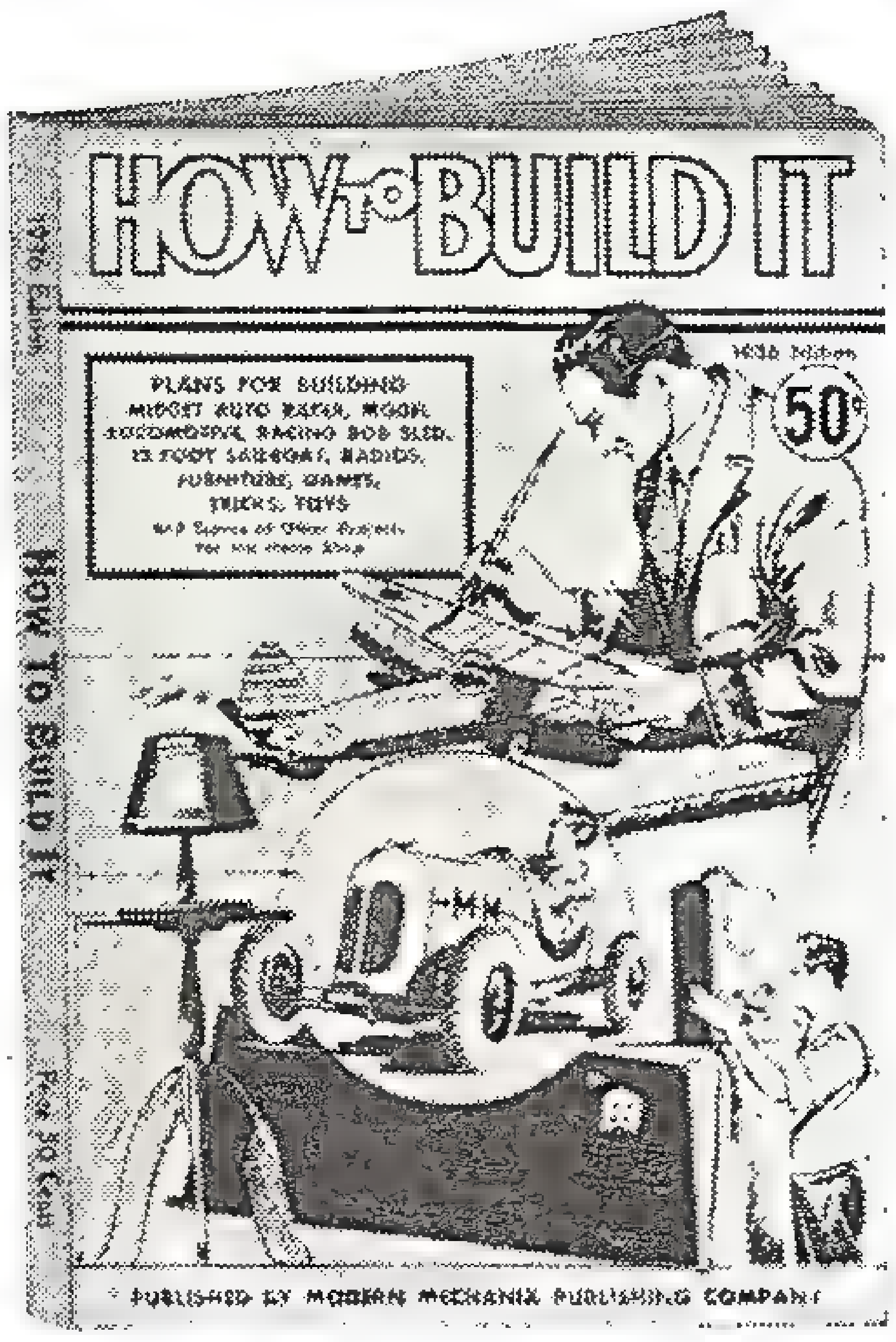
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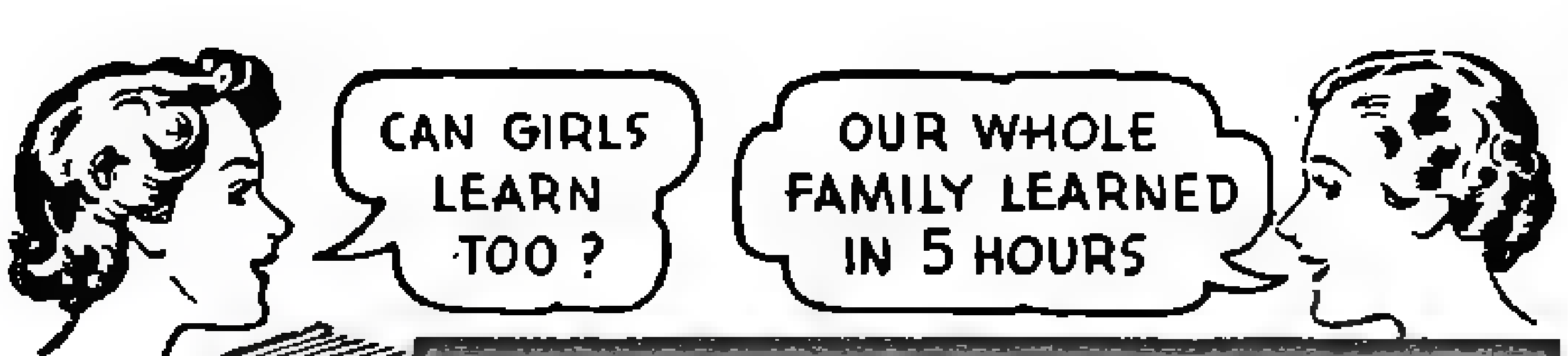
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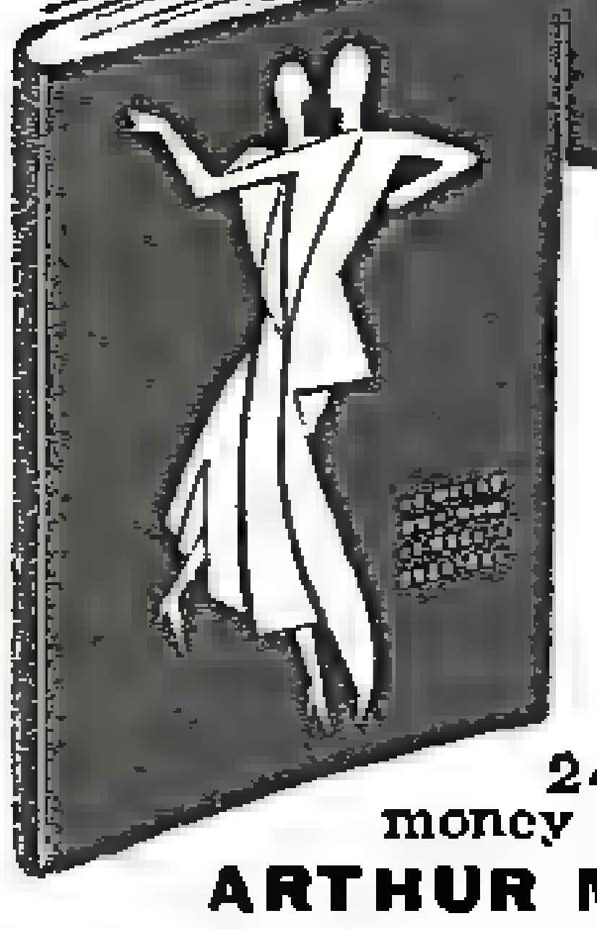

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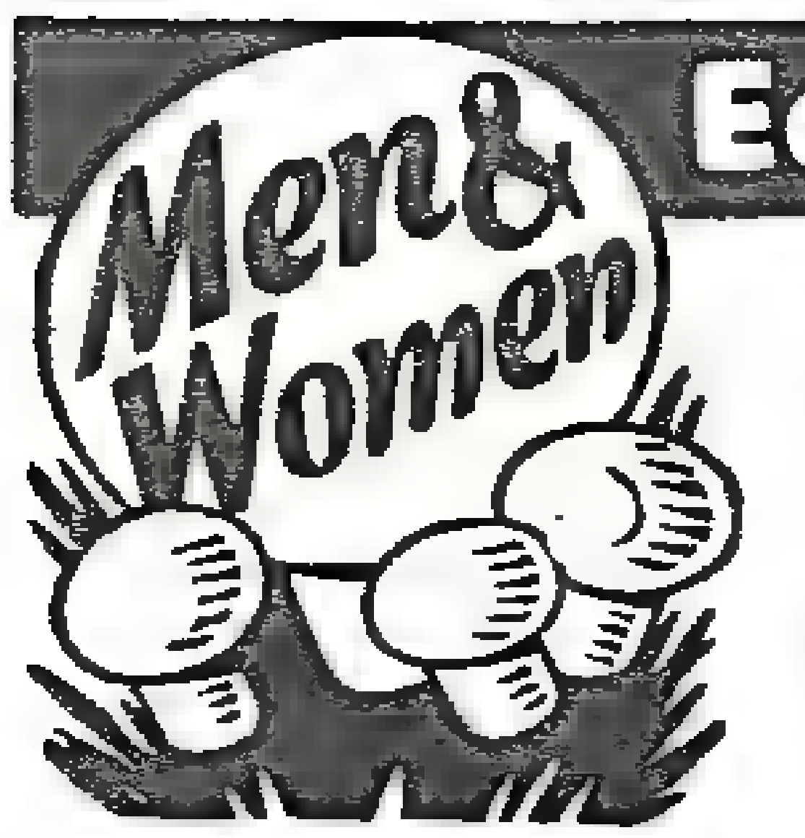

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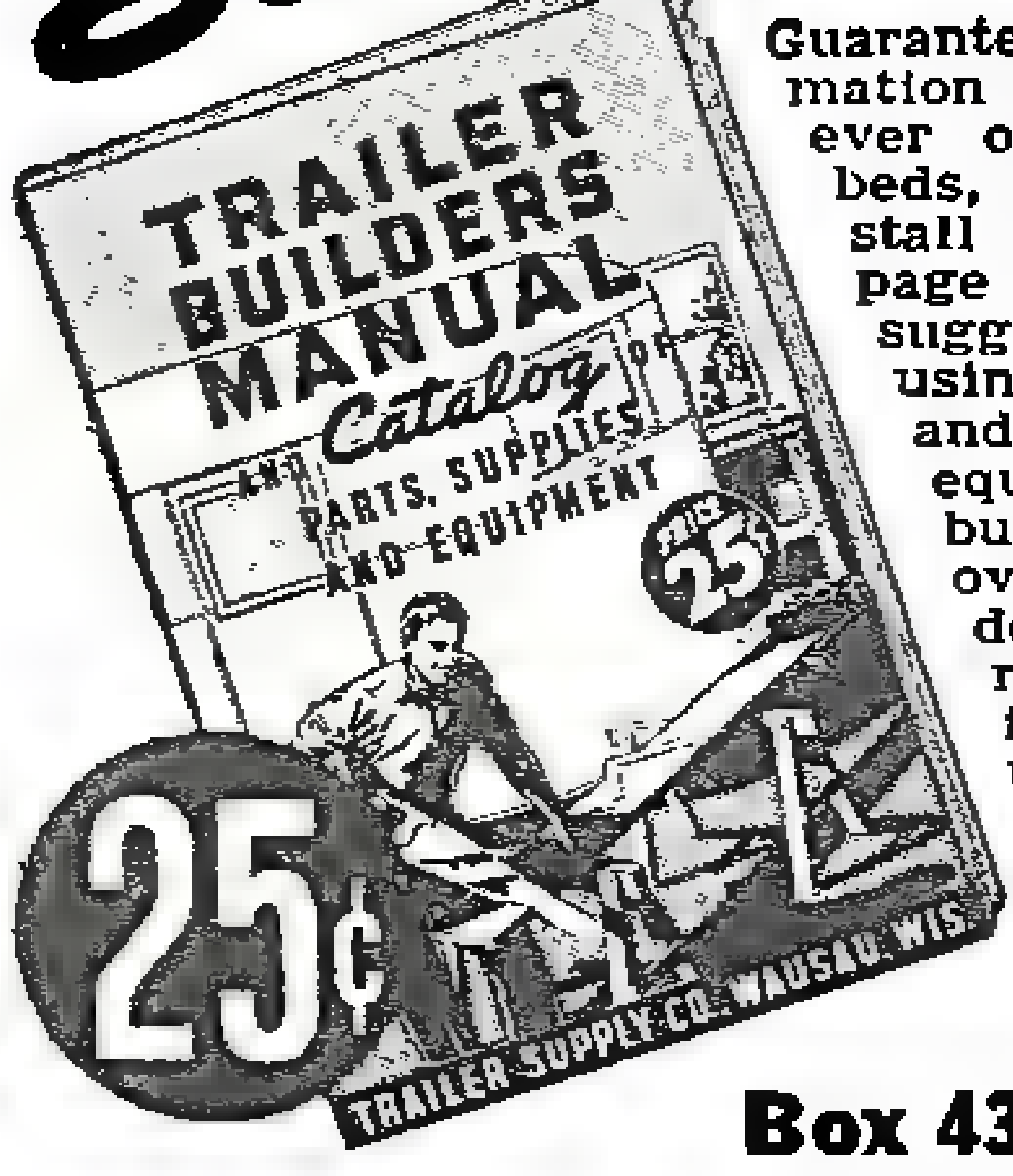
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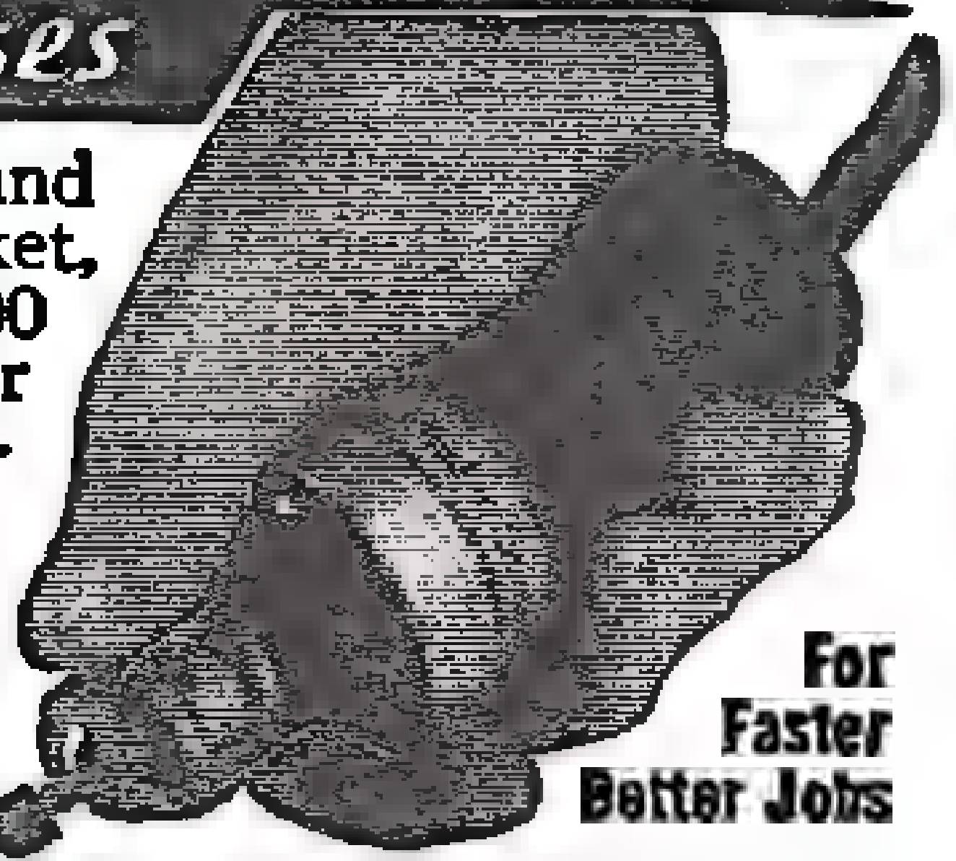

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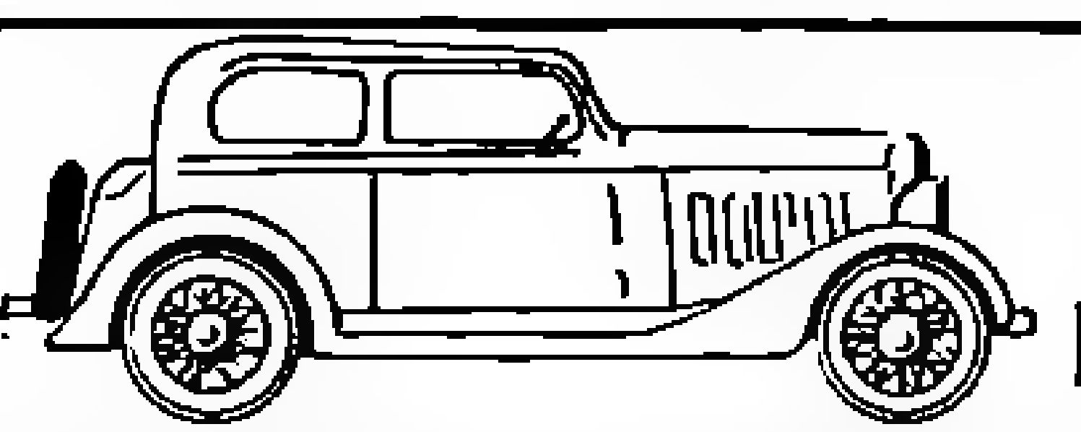

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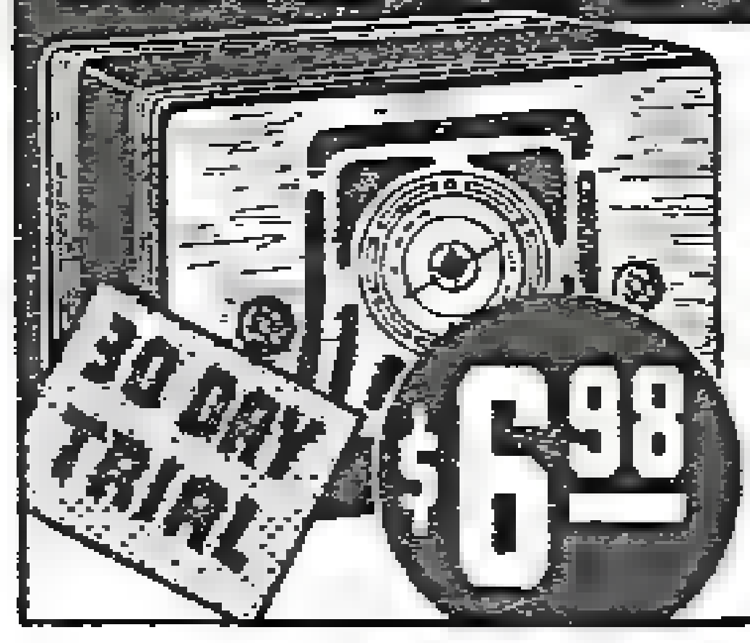

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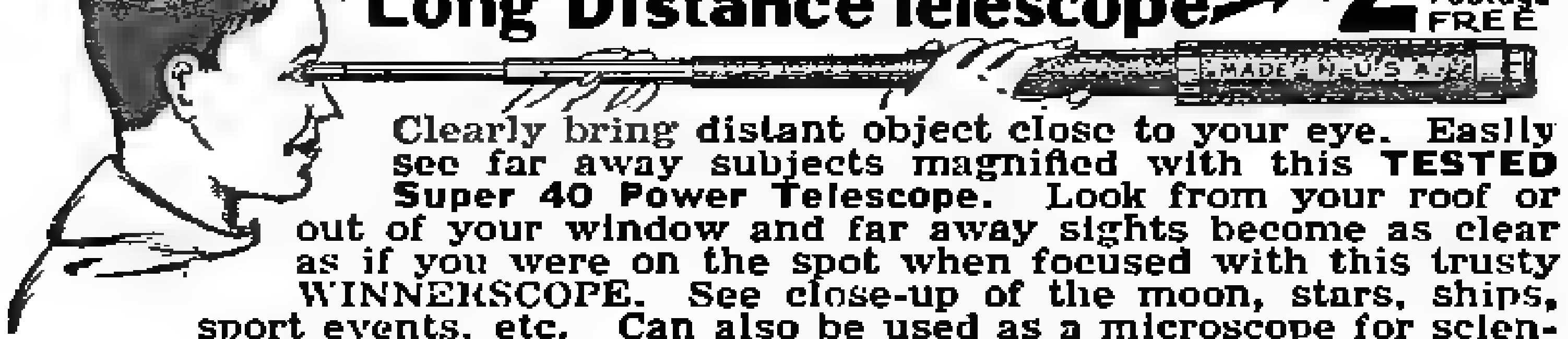

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Random Chips from

Soap Box racers invade MM Boat fans show ingenuity. Midget car builders report success. Editor issues call for photographs. Distant countries are heard from.

WHAT the Indianapolis Classic is to auto racing and the Kentucky Derby is to horse racing, so the Soap Box Derby is to every youthful driver who has ever piloted a four-wheeled push-mobile down the biggest hill in the neighborhood. These free-wheeling chariots have got a certain zip and dash to them that none of the big cars seem to have, and for that reason the Soap Box Derby is fast becoming a national institution, just like the Classic and the Derby.

Now that vacation time is here again, it seems that most of the boys in the country are out building their racing soap boxes or hunting for plans to go by. MM is on hand to co-operate with all the builders. Not only are we running a big feature in this issue on all the mechanical details which go into a racer, but we are giving away two complete Soap Box racers and a set of balloon tired wheels as prizes in a new contest. You will find the details on Page 54.

***

This brings us right up to our own workbench contest. This time the first prize of $5 goes to Don Weisbard of Hollywood, Cal. Don decided to use the experience he had gained as a soap box engineer to build a midget automobile. That he was successful can be judged from the photo which appears on this page. His letter follows:

Hollywood, Cal.

Dear Editor:

Enclosed herewith is a photo of a midget car powered with a one-lung, two-cycle motorcycle engine. I built it myself from scrap materials. It has a five foot wheel base, is seven feet long and thirty inches high. It has a low and high gear, a plate clutch and chain drive. She will do about 38 miles per hour when wide open.

I found that aluminum disk wheels were necessary in the rear as the spoke wheels can't take it when the power is applied. The spoke wheels work fine, however, in front.

The little model next to it (in the photograph) is designed from a midget auto racer and is only ten inches long. It has an all-metal body, dummy engine, steering device, etc. I expect to have it chromium plated.

Don Weisbard.

***

Our boat building fans were present in even increasing numbers this month. One of them, Ed Olson of San Carlos, Cal., walked off with the second prize of $3 in our monthly Editor's Workbench Contest. He writes:

San Carlos, Cal.

Dear Editor:

I am sending you a picture of the kyack my friend and myself built. We had great fun building it from plans we found in the first edition of "How To Build 20 Boats." After a great deal of thought and study, the plans were changed to hold two people instead of one. It has carried 340 pounds easily.

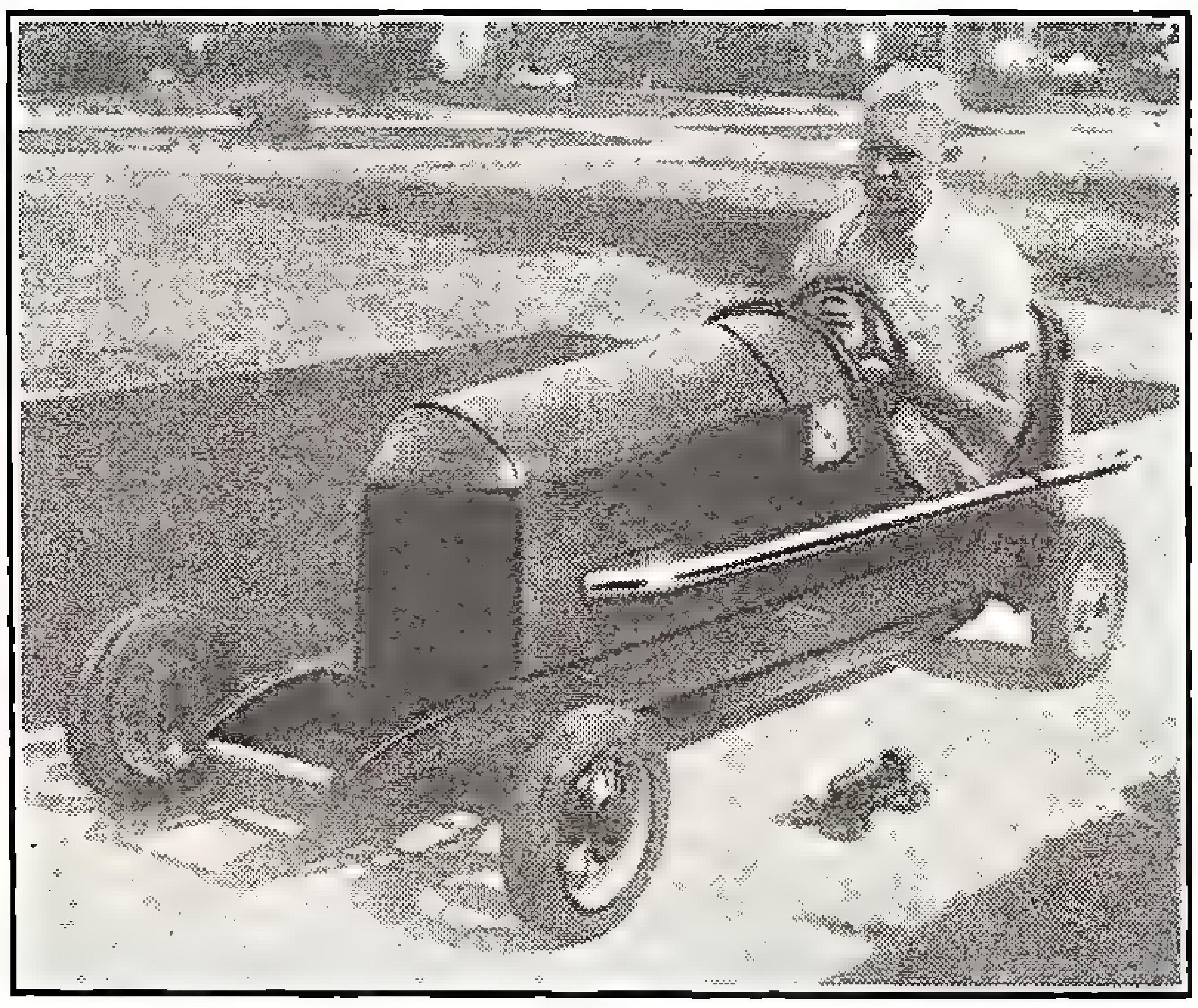
I do not dislike any article in good old MM.

Ed Olson.

We have some good news for many of our readers in regard to our first edition of *How To Build 20 Boats*. After turning down orders right and left for nearly a year because we thought the edition was out of stock, Jimmie, the stock boy, reports that he found about 200 copies while moving the MM files to new quarters. You can get your copy of the first edition of *How To Build 20 Boats* now, if you hurry, by sending fifty cents to this office. The second edition is also in stock. Be sure to specify which edition you want.

***

One of our Paragraph Oddities in a recent issue concerning the custom of driving to right or left in Austria brought an interesting letter from one of our British readers. He has driven all over Europe and he says, quoting parts of his letter:



As neat a job as we have seen in this office for some time is this midget racer built by Don Weisbard. Note the model beside it. Don wins the first prize of $5 for this month.

the Editor's Workbench

Eggar's Hill, Aldershot, England

Dear Editor:

Having read the paragraph in a recent edition of your excellent magazine, I thought I might be able to enumerate a few other points of interest about driving an automobile in Europe. Most countries in Europe have their own special laws, confusing to the foreigner. For instance, in Czecho-Slovakia it is an offense to smoke while driving. In Germany one must not carry any red lights on the car. Thus most of the tail lamps are orange.

On the mountain roads in Switzerland some of the roads are very steep and narrow. A one-way traffic system is in operation, cars going up at one time, and down at another. Mail trucks are painted yellow, and the motorist must always pass these trucks on the precipice side of the road so that whatever may befall, it will not be the mail truck which goes over the cliff.

In France the small villages have open drainage systems carried across the main road by a trench about two feet wide and one foot deep. These ditches are very dangerous, being quite invisible in the cobbled streets. In Yugo-Slavia cars are very rare and there are few roads. Needless to say there are no garages and petrol is bought at the local chemists for about a dollar a gallon. In Monaco, the small state containing Monte Carlo, one's speed must never exceed 9 miles per hour under normal circumstances, and a walking pace in dangerous places. Failure to comply often entails confiscation of one's automobile. In Holland heavy motorcars must have a deep noted horn, and a light car or motorcycle a high pitched one.

I hope these points may be of interest to you.

Arthur Garratt.

This boy-powered scoop shovel, built from MM plans as a present for his brother, wins for Gordon Christiansen the third prize of $2.

* * *

The third prize of $2 this month goes to Gordon Christiansen for his boy-powered steam shovel. Here is what he says about it:

Ryder, N. Dak.

Dear Editor:

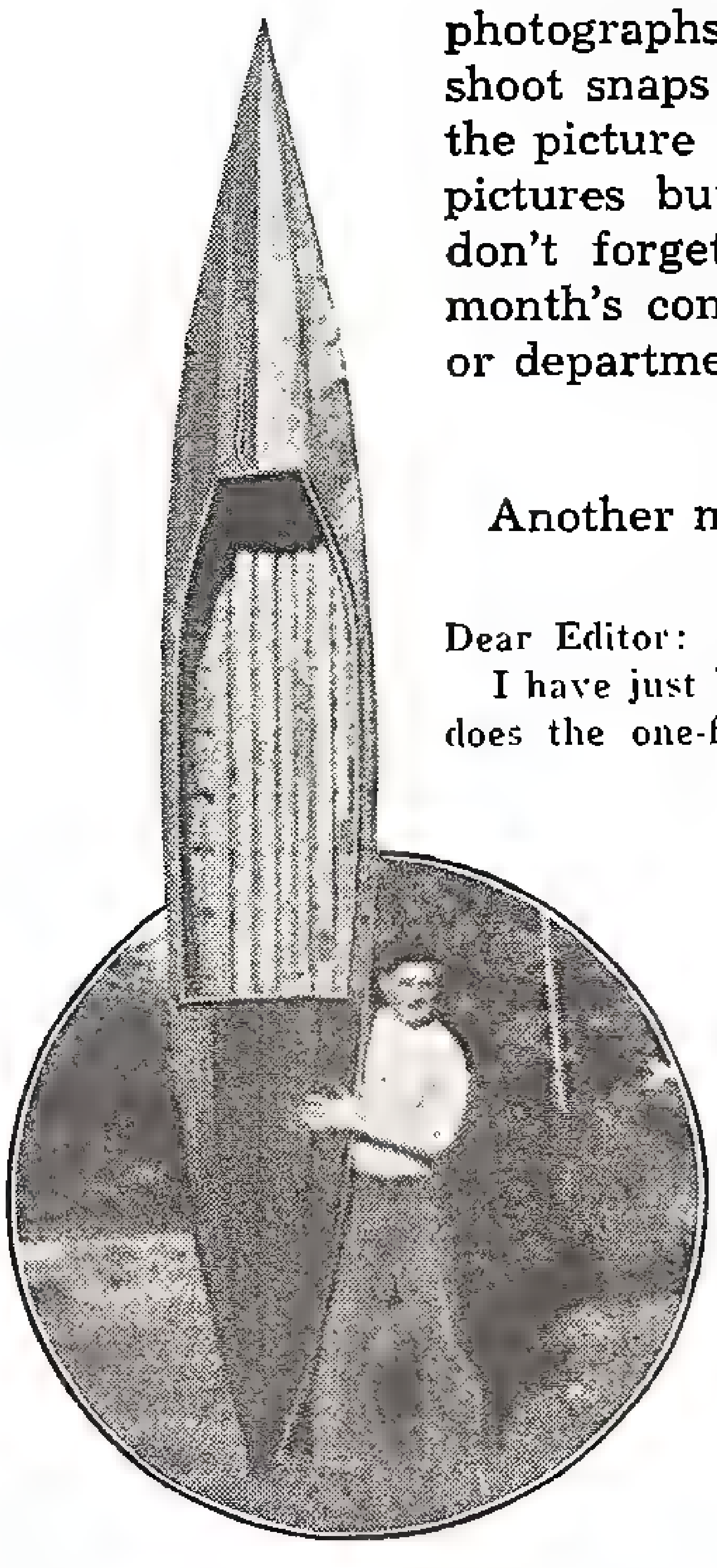
I am enclosing a snapshot of the boy-powered steam shovel built from plans in the April, 1935, issue of MM. (Also included in the 1936 "How To Build It" Book). I built it as a present for my brother.

It is surprising how well it works. The things it can do far exceed what I expected of it.

The articles I least enjoy in MM are magic tricks for the amateur, but as a whole I like most all of the articles. I miss one page that used to be in the magazine called "Auto Generator Kinks." Long live MM Magazine. I think it is a great book.

Gordon Christiansen.

Right now we want to register a complaint against you. Yes, you—the reader! You are too modest. While you are all willing to send us all kinds of photos, few of them are clear enough for publication. If you want to win prizes in the Workbench's monthly contest, take a little time to get good photographs of the things you are building. Don't shoot snaps of the project itself. Put yourself in the picture or let a friend pose for you. We need pictures but they must be good pictures. And don't forget one of the requirements of each month's contest is, you must state which article or department you liked best, and which least.



Here is an enlarged version of MM's kyack plans. It was built for two passengers instead of one by Ed. Olson. He wins the second prize of $3 in the monthly Workbench contest.

* * *

Another midget car builder writes in to say:

Mauch Chunk, Pa.

Dear Editor:

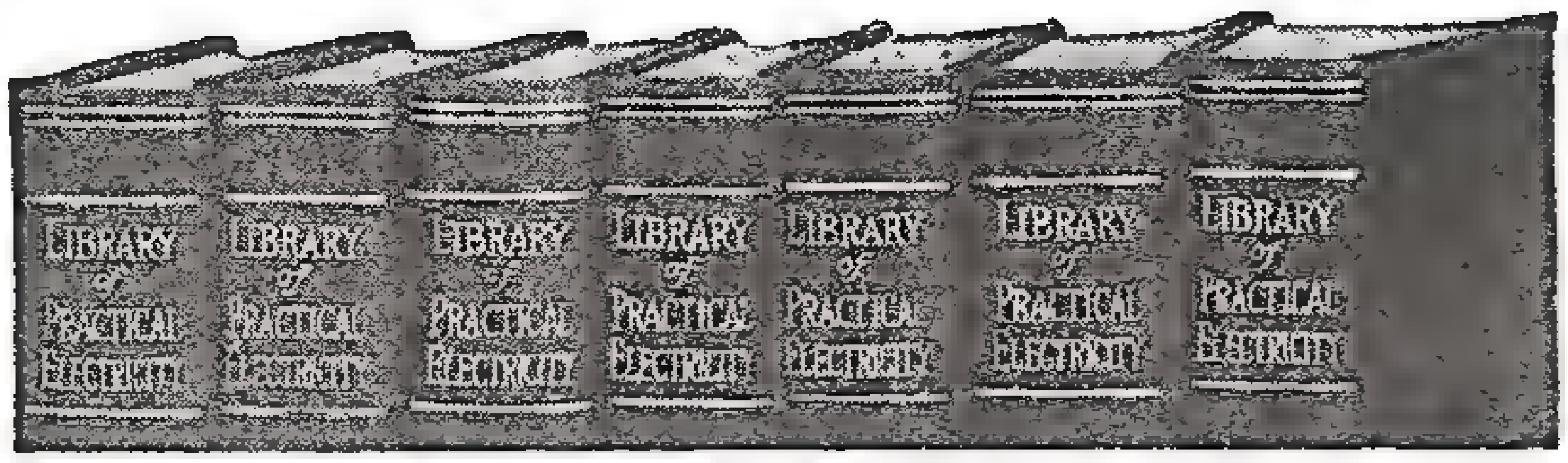
I have just built a midget car during my spare time. She does the one-fifth mile in 12 seconds and holds the road like a Cord. She is a front-drive 4-wheel brake job driven by a motorcycle engine. Makes thirty miles to the gallon and weighs 1,150 pounds. Uses 20x4 tires mounted on 12-inch wire wheels. Qualifies under all midget racing classifications. I will answer any questions concerning car if readers will ask me.

William Miller.

* * *

Here is a letter from a fan who believes in putting his workshop and MM to work. He makes it a point to keep all his MM copies on file where they can be located as needed. That it is a good policy you all will agree when you read his letter.

[*Continued on page* 22]



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Chips from the Editor's Workbench

[*Continued from page 21*]

Cambridge, Mass.

Dear Editor:

While reading MM tonight I got up enough courage to write to you. That's something I've been meaning to do for the last four or five years that I have been reading your magazine. Incidentally, what I like most is Random Chips, Electrical Kinks, and Shop Kinks. There never are enough to suit me.

Now I have made an electric power plant for the home, a tractor from an old car, and electric welder from a Dodge generator, a saw bench for the shop, a blast furnace, a gas and air torch, an air compressor from a refrigerator unit, and oil burner for old crankcase oil, grinders, a press and so on. I could fill a page with things I have built from old MM. I keep my copies all stacked up in my Data Closet, and when I want to make something, I look up MM for the dope and I am very seldom disappointed.

Louis Boutin.

Edward LaCrosse of Iron River, Wisconsin, is the builder of this Moth class sailboat for racing.

We would say that that is a pretty imposing list of completed projects as it stands now.

***

"I like best the Editor's Workbench," writes Clarence Eltz from his home in Juniata, Nebr. "I always like to see the things that others make. I also like any blueprints of models or full sized plans. Your magazine goes into such detail in the plans it is a pleasure to work from."

Thanks for the bouquet. That is one thing we always insist upon, plenty of detail so that the experienced builder and the amateur alike can get right to work on one of our projects without having to spend half of their time trying to figure out the plans.

***

Here is the answer to the question—"Why build a boat?" It comes from Kenneth Henshard of St. Paul, Minn. He writes—

St. Paul, Minn.

Dear Editor:

I have just finished building **Oriole.** (A cabin cruiser from our second edition of **How To Build 20 Boats**). I am a cabinet maker by profession and I thought about all I would have to learn about boat building would be to learn the difference between a chine and a sheer. I learned the difference all right, and about a thousand other things that

[*Continued on page* 24]

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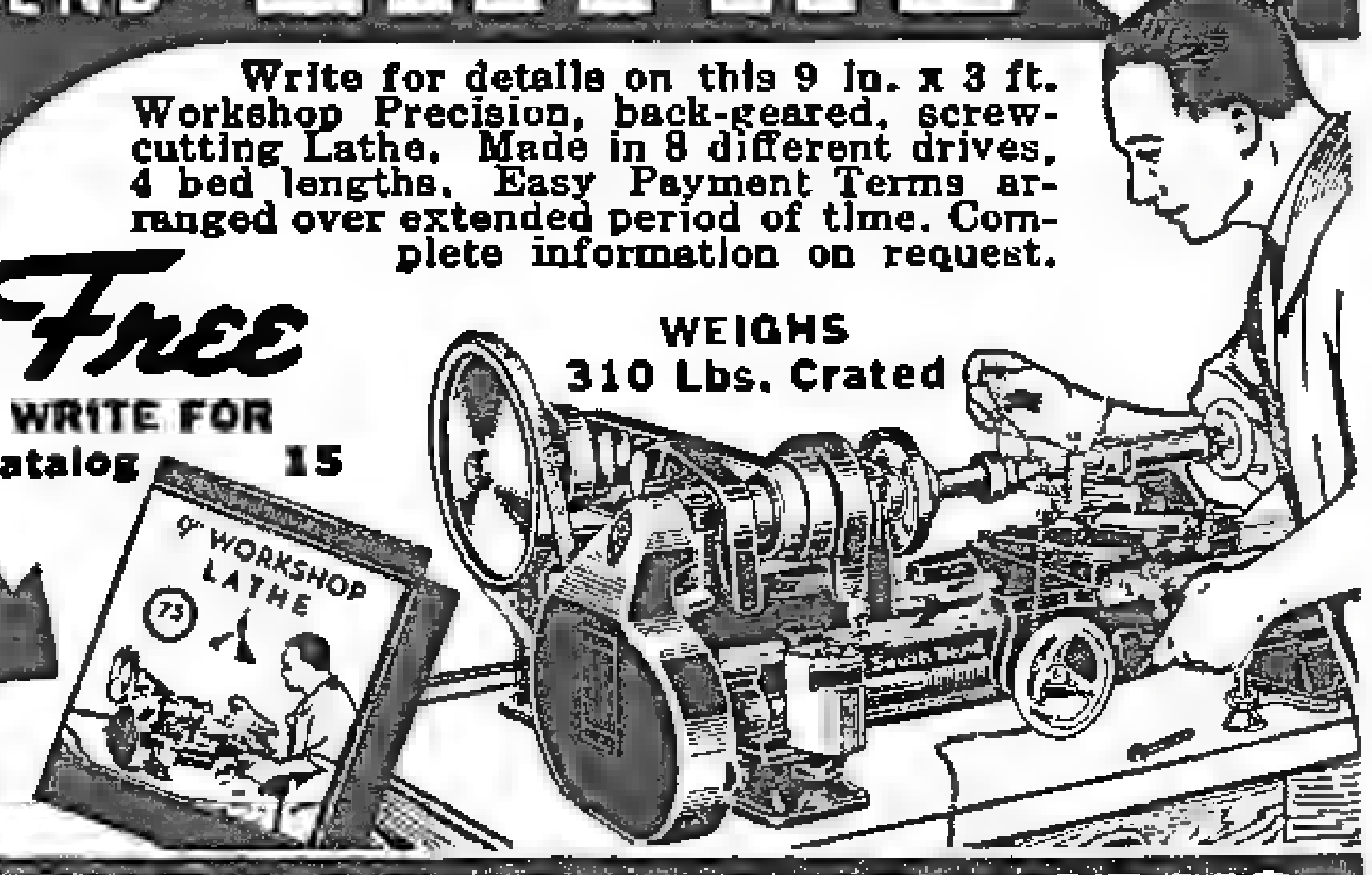

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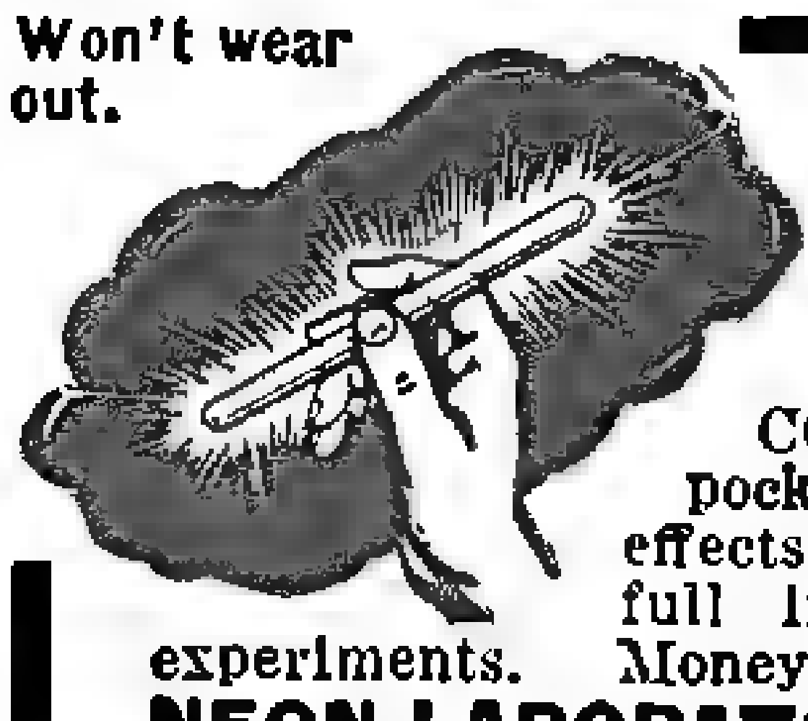

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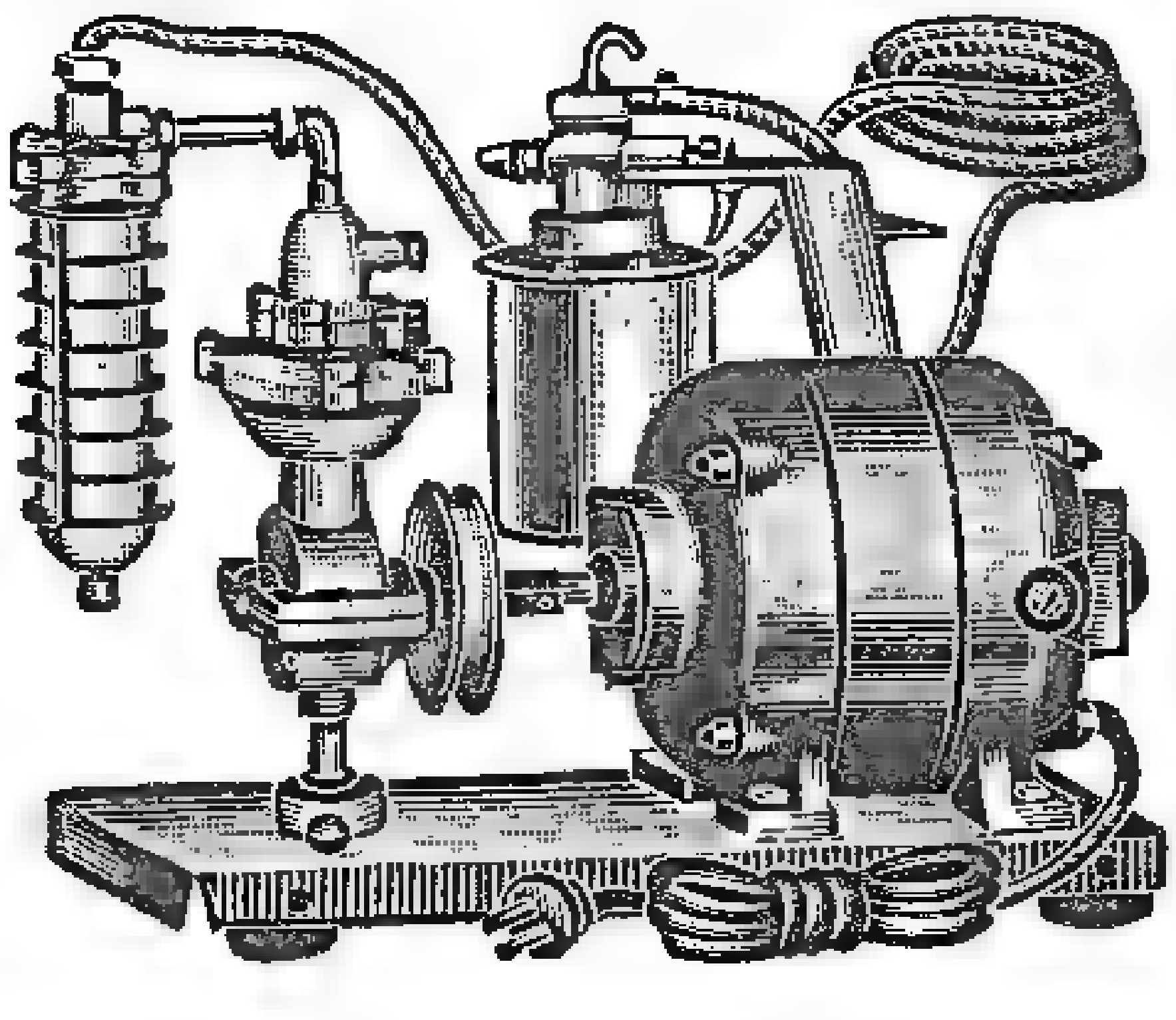

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Dear Mac: Send me a catalog. I just want to look over the old school. I am getting along fine, doing a good business, all thanks to you and your training. Will you send me another Diploma, as mine was destroyed. I was in the class of '21. I send my best regards to the instructors and to you, also.—Leo Foreman.

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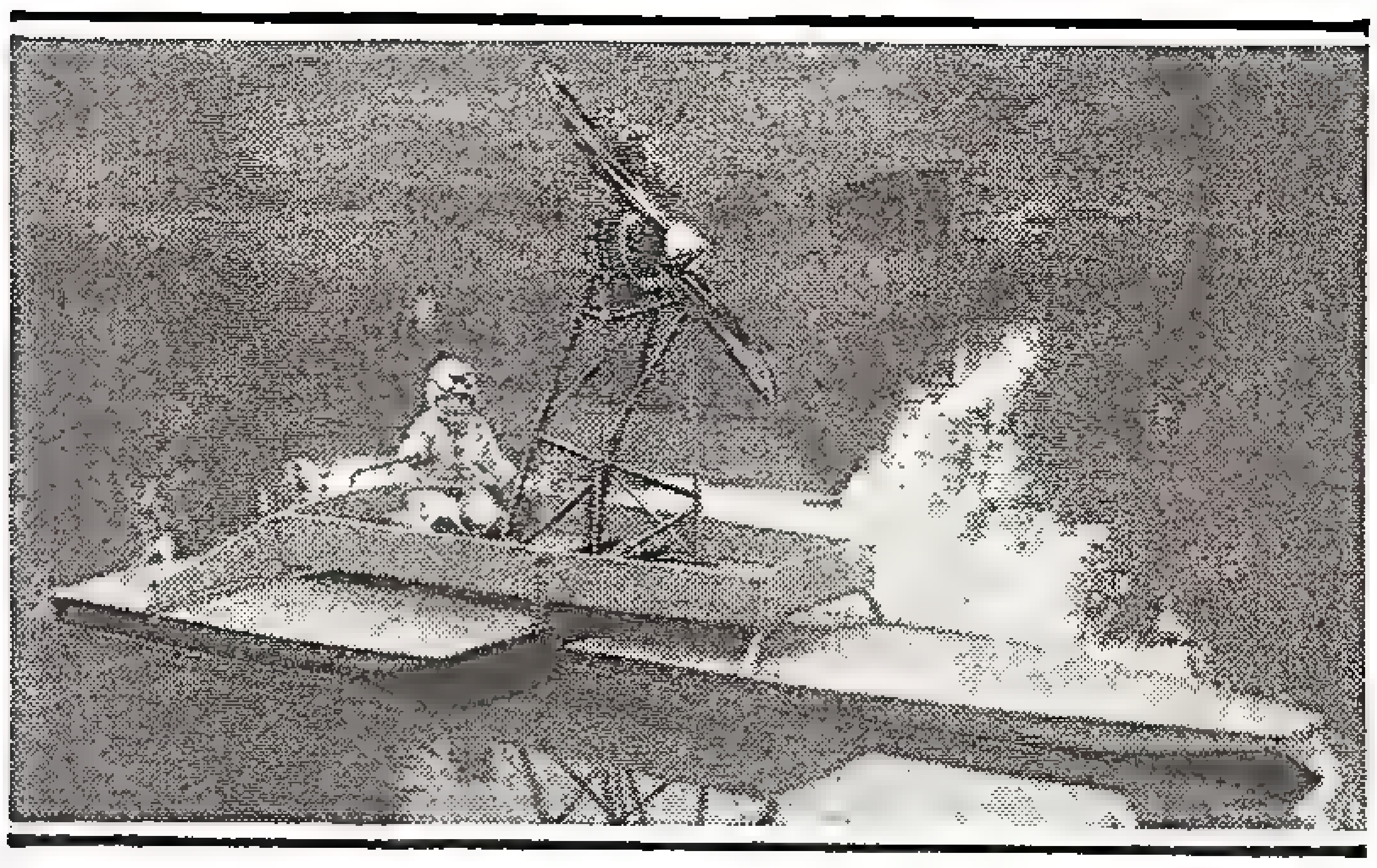
Chips from the Editor's Workbench

[*Continued from page 22*]



A 1912 model single cylinder engine powers this unique air drive boat. Built by Norman E. Walker of Portage, Wis. Has a cruising speed of 7 m.p.h. Shallow water is no obstacle.

I never knew such a small thing as a boat could hold. But it was fun, and if I can get as much enjoyment out of running **Oriole** as I did in building her, I'll have double my money's worth.

In my opinion a water tight boat is the highest form of cabinet making. When I am building a piece of furniture, I have to be pretty careful that all the joints fit tight, but it isn't necessary that they are watertight. But on a boat every joint and seam must fit perfectly. Cabinet making may be a help when it comes to fitting out the cabin, but in building the hull, my brother, who just tinkers around my shop now and then, did just as good a job as I did. So I guess you are right when you say anybody can build a boat.

Kenneth Henshard.

***

It was a little early yet for any mail to reach us concerning Cruisemite, the trailer we published last month, but we know she'll prove a winner. Let's hear what you think about her. The way everything is starting out, it's going to be a great summer.

***

RANDOM CHIPS—William Brown of Youngstown, O., says: "My midget auto, built from plans in your magazine, is equipped with a ¾ horse power washing machine motor. The mileage is very high, about 50 miles to the gallon." John M. Tucker of Albia, Iowa, also reports favorable results with a washing machine motor on his midget car. He says, "It has a pulley and chain drive and makes about 19 miles an hour. It is geared down to a ratio of 4 to 1." Lester Rekonty, 346 W 14th St., Norfolk, Va., would like to get in touch with MM readers in foreign parts of the world. He says he would especially like to get in touch with stamp collectors.

***

With that we turn out the light over the workbench and call it a day. Don't forget the photos. We want more and better photos with a lot of human interest in them.

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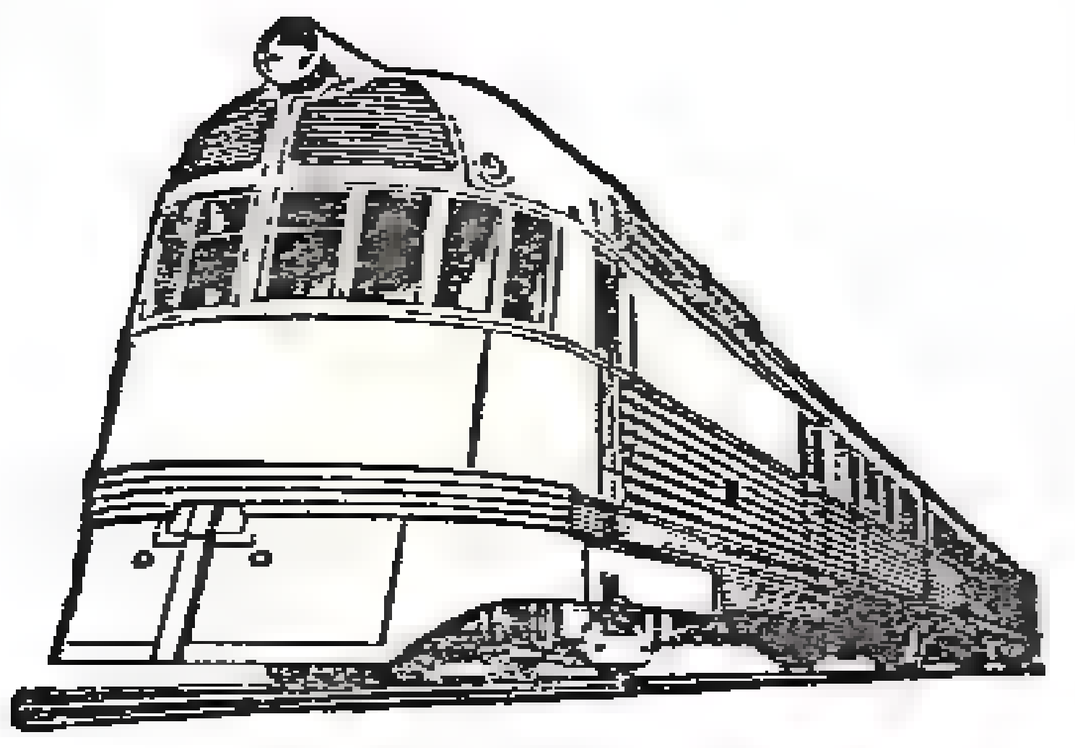

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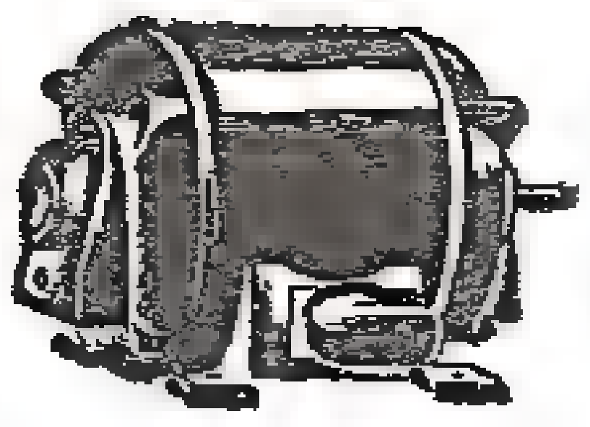

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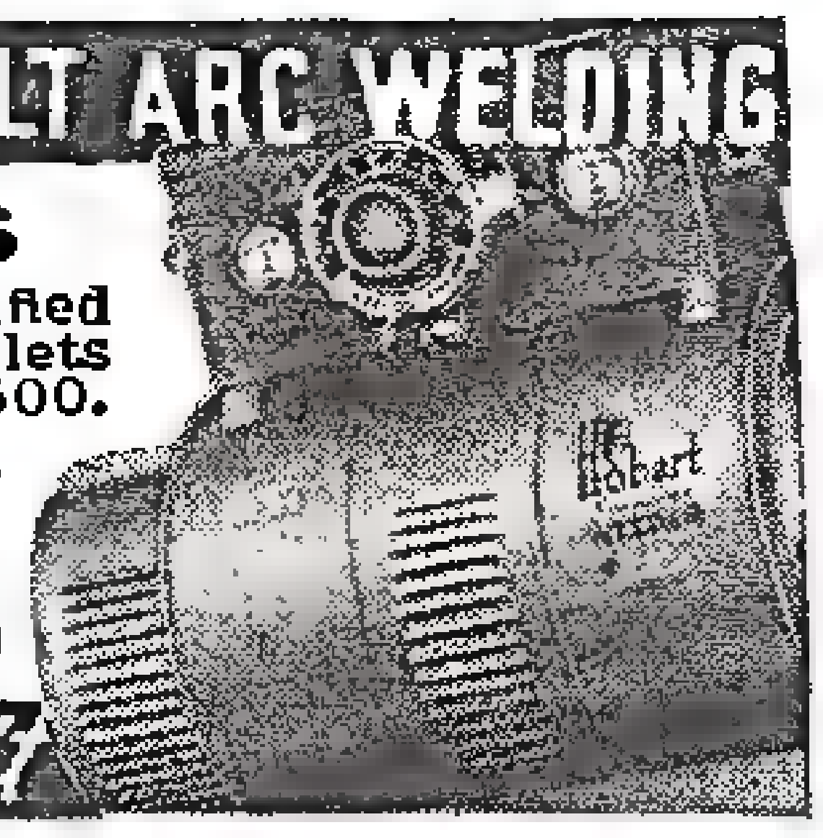

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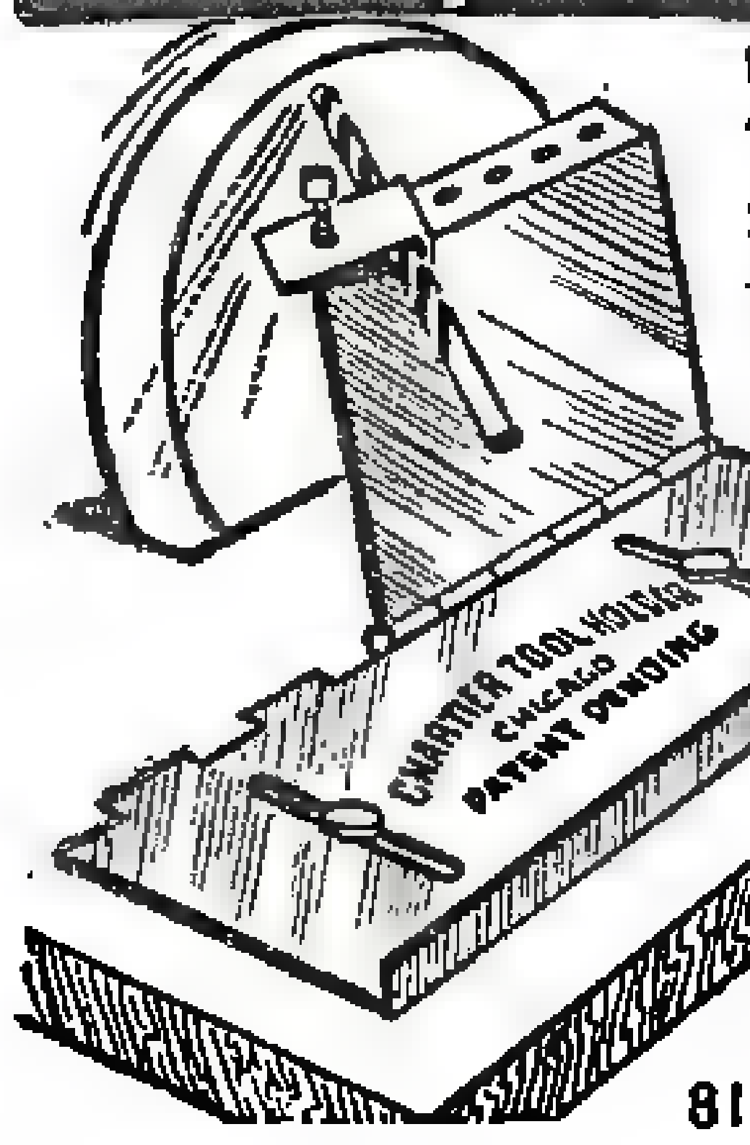

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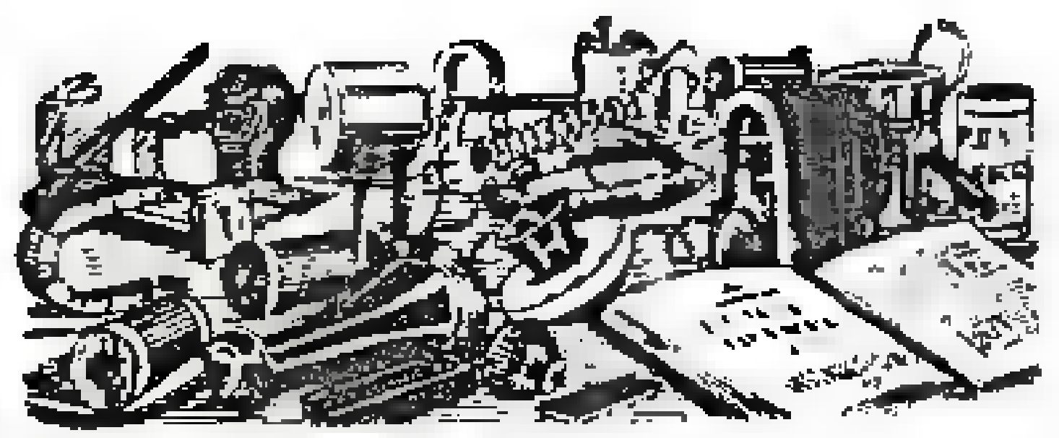

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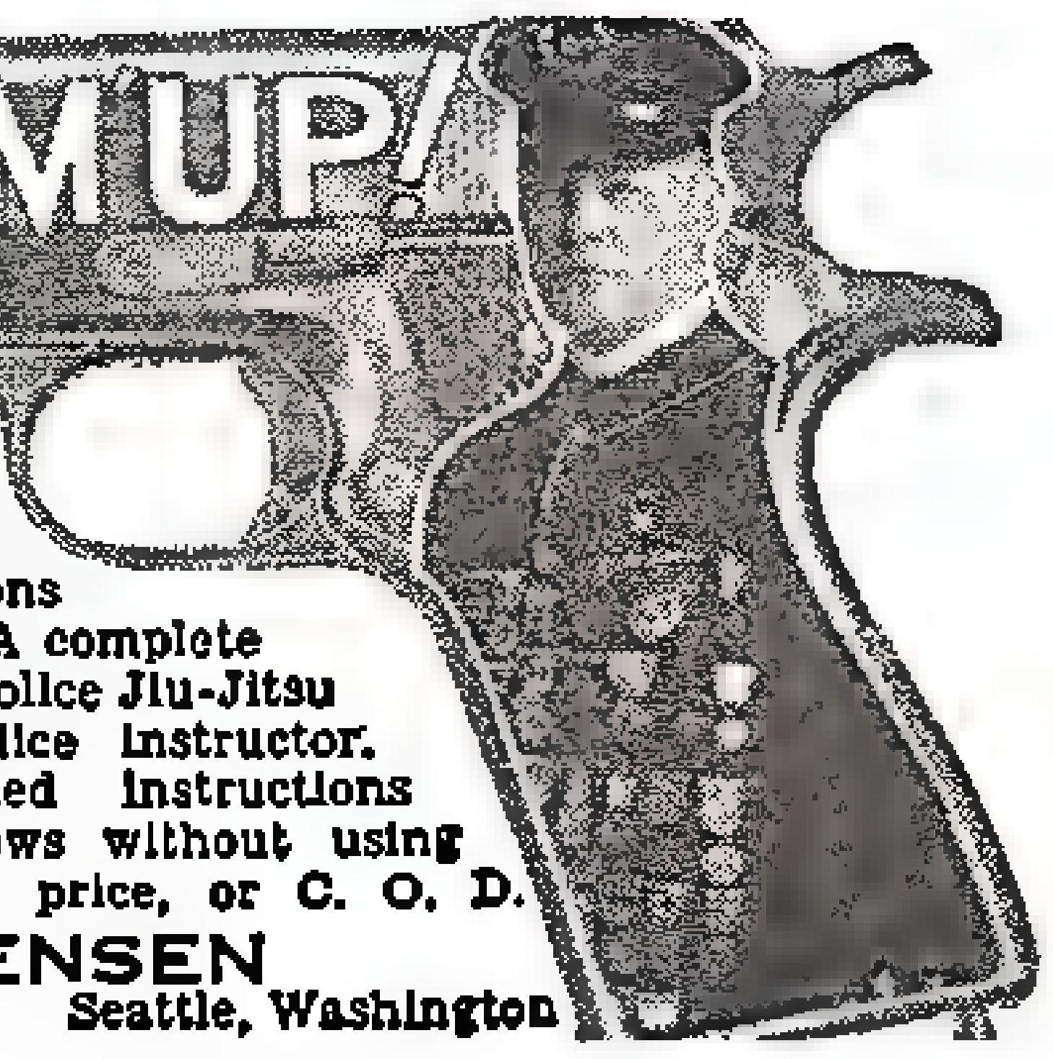

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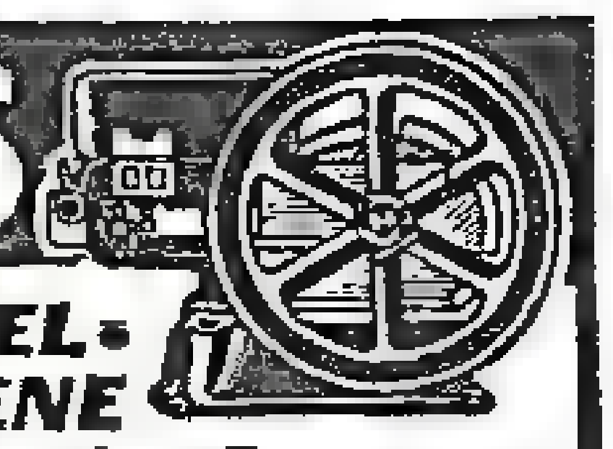

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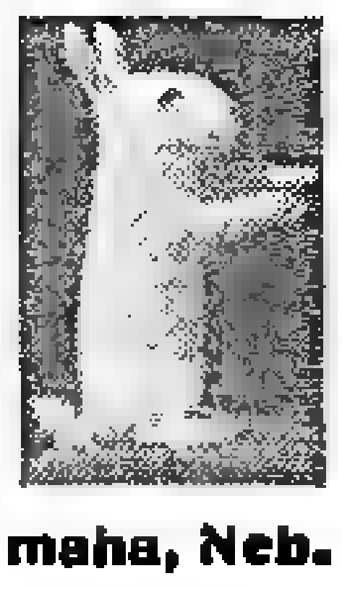

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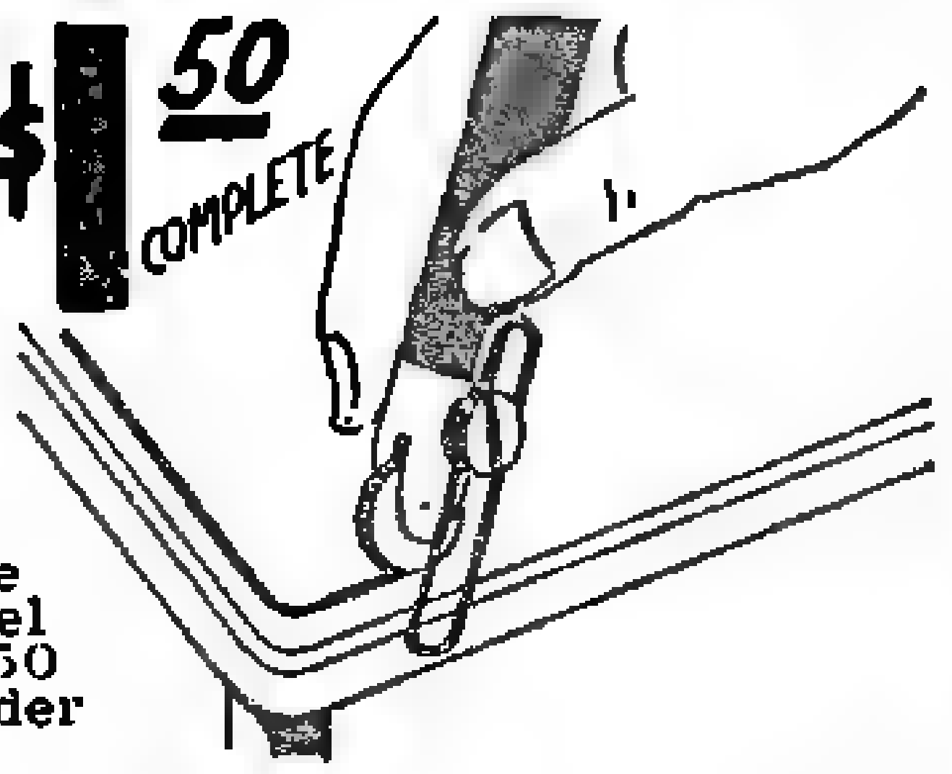

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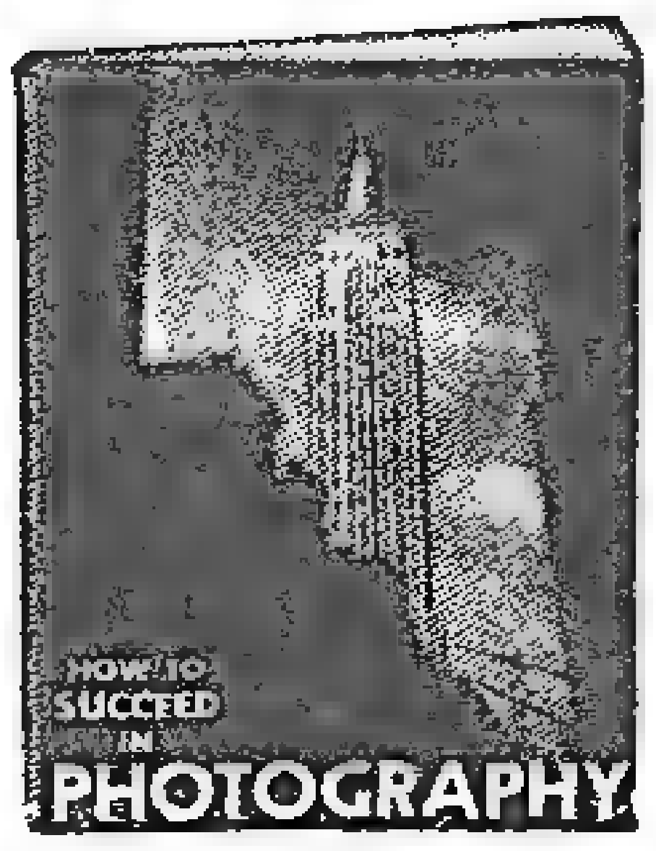

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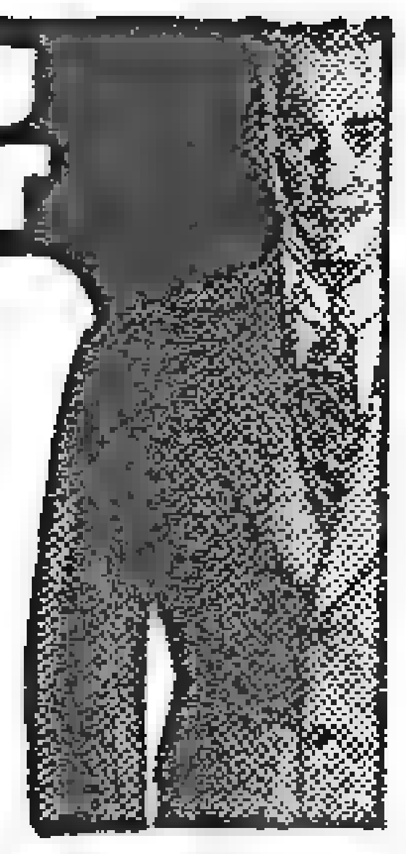

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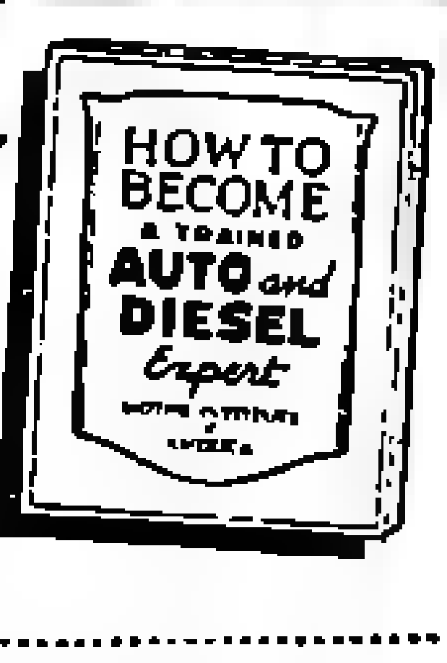

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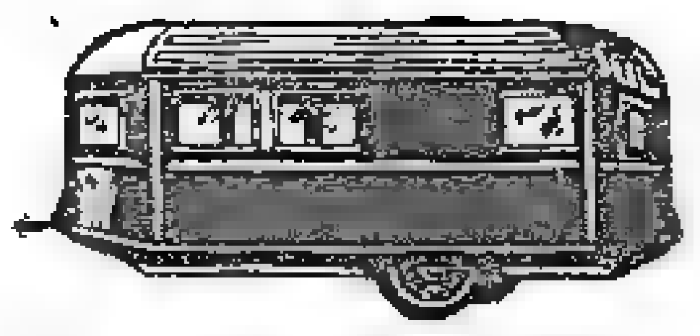

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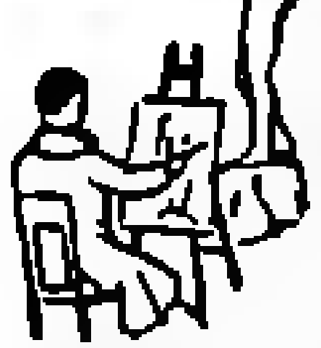

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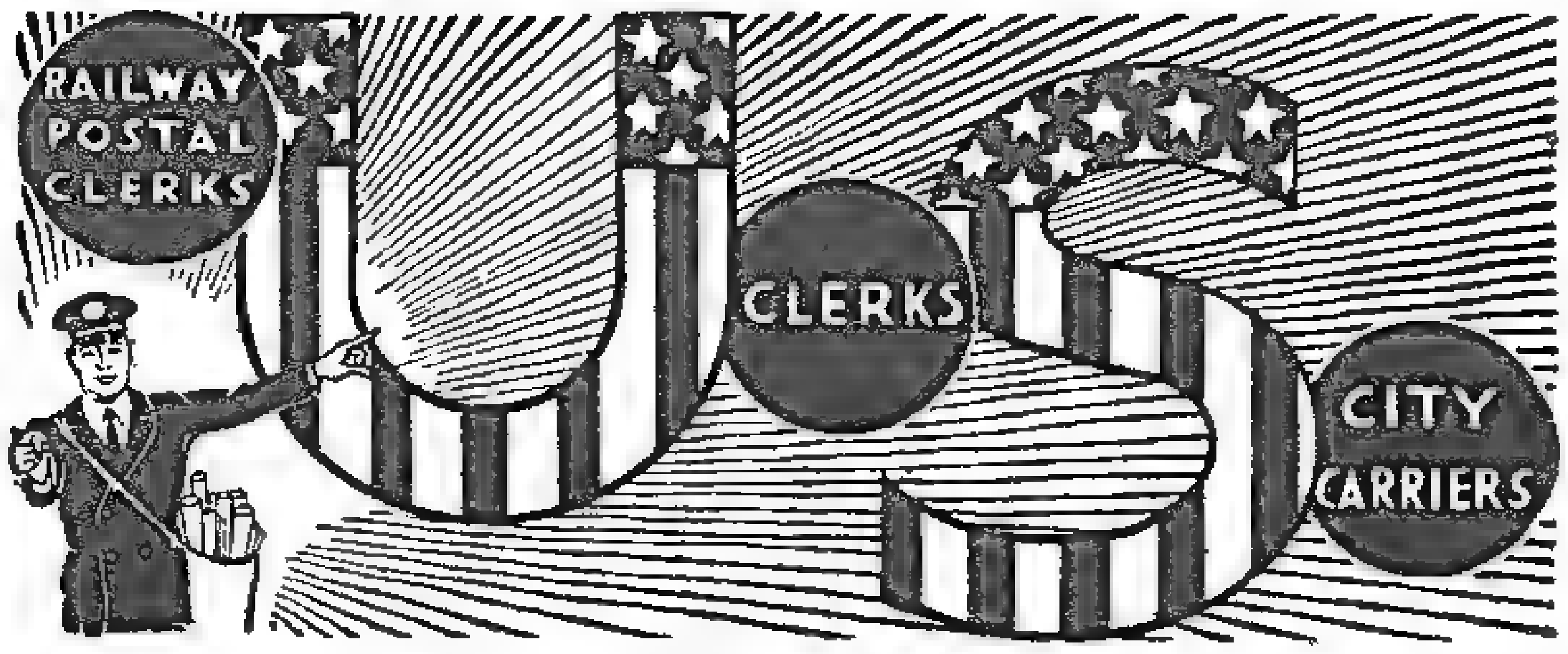

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The NATION Sits in

Scenes such as this at the Republican Convention of 1932 in Chicago will be duplicated soon by the Democrats at Philadelphia and the Republicans at Cleveland. Millions will listen by radio to the proceedings.

Circle, above—Gov. Pollard of Virginia proposes a resolution at a National Convention. Note directional microphone behind him and broadcasting microphones before him.

THE political machinery for nominating the presidential candidates of the two major parties remains as old as the parties, but in June this year the entire nation will be given ringside seats at the National Conventions at Philadelphia and Cleveland, with both parties taking advantage of every latest scientific wrinkle to bring the conventions to your home or local movie.

In stadiums, ball parks and town squares loud speaker systems will be set up for the hundreds of thousands of persons who will assemble on the evening of June 27 to hear President Roosevelt accept the Democratic nomination. Republicans, too, are planning on having their candidate broadcast his acceptance of the nomination from their convention hall.

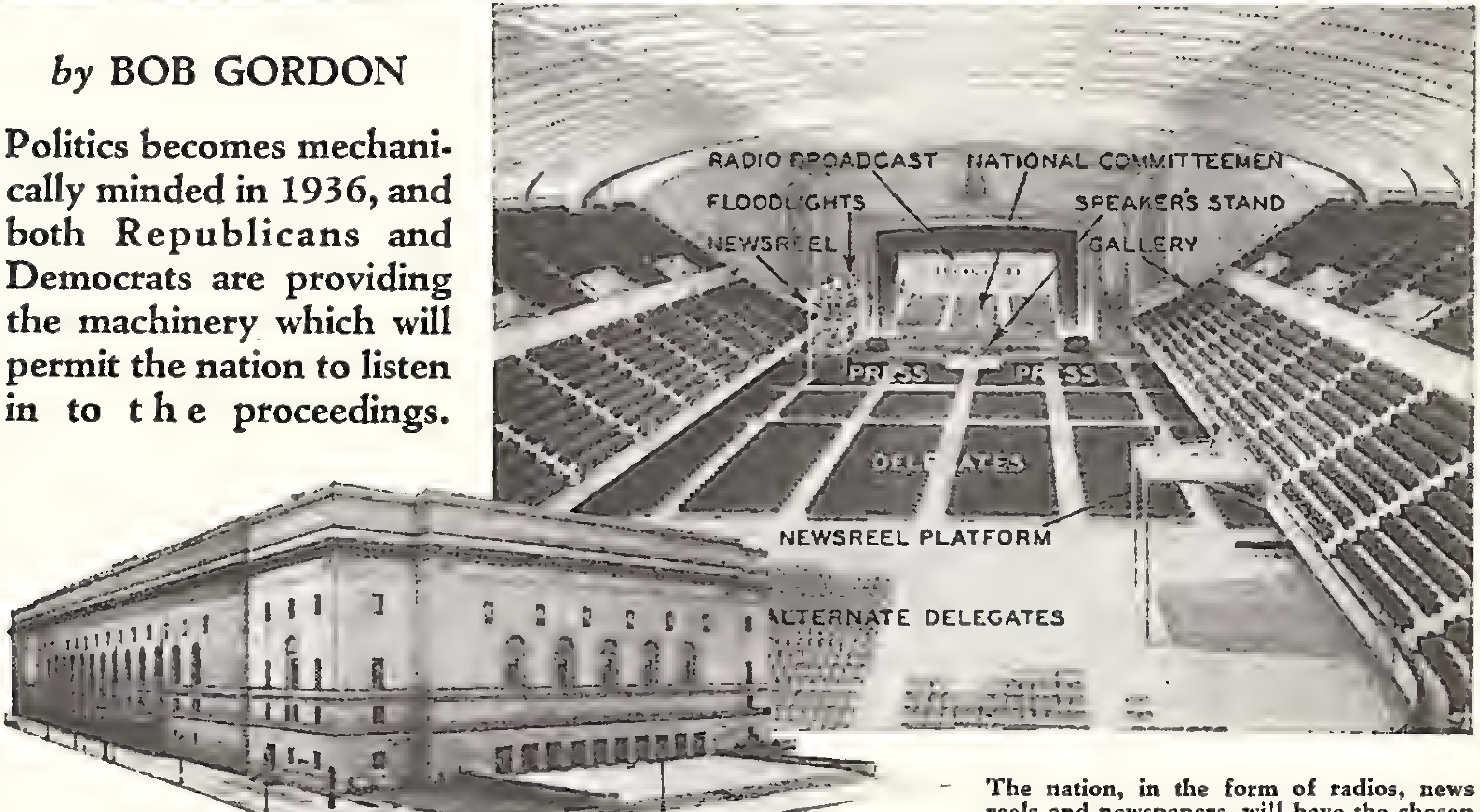
More than six thousand persons will journey to the convention cities to select the men for whom you will vote this fall. There will be 1,200 delegates at the Democratic Convention in Philadelphia, with 1,700 alternates, while the Republicans at Cleveland will have 997 delegates and 1,116 alternates. Then there will be the 106 National Committeemen of each party, more than 1,000 reporters, and several hundred telegraph, radio, newsreel men and news photographers.

The voting delegates will be seated in the front of the hall in four gigantic banks of seats. Delegations from each state will be seated together, with huge signs designating the seats. The alternates will have chairs

on National Conventions

by BOB GORDON

Politics becomes mechanically minded in 1936, and both Republicans and Democrats are providing the machinery which will permit the nation to listen in to the proceedings.



The nation, in the form of radios, news reels and newspapers, will have the chosen seats at the Democratic Convention in the Philadelphia Auditorium. Above is shown seating arrangement. Left—The Cleveland Auditorium into which will parade 997 Republican delegates; 1,116 alternates.

EXAS
ROOSEVELT

Wild demonstrations accompanied the nomination of Franklin D. Roosevelt, Democrat, for the presidency in 1932. All state delegates, bearing placards, paraded past the speaker's table.

on the auditorium floor directly behind the delegates. Aisles between the banks of seats will be especially wide.

The speakers' stand will be an elevated platform erected on the front center of the stage. On this platform will be the Chairman of the Convention and the principal speakers for the day. On this platform also will be the operator who will control the radio and newsreel microphones and the public address system through a maze of 53 switches.

From a technical point of view, this switchboard operator will be the most important man in the convention hall, for he will have complete control of all sound effects. It will be he who will, under the direction of the Convention Chairman, sort out the correct speeches from the bedlam created by a thousand men all anxious to talk at once, and to see that the voice of only the speaker recognized by the chair is amplified on the public address system, is broadcast to the nation over the three networks, and is recorded by the newsreel camermen.

On the rostrum of the speakers' platform will be the three microphones of the broadcasting companies. The voice of the regular speakers will be carried directly to the soundproof studios erected over the back of the stage, and from there, over telephone lines, will be carried to the hundreds of broadcasting stations on the networks. The five newsreel companies will also have microphones here connected directly with recording ap-

[*Continued on page* 129]

Highest STRATO-PHOTO Covers 330 Miles

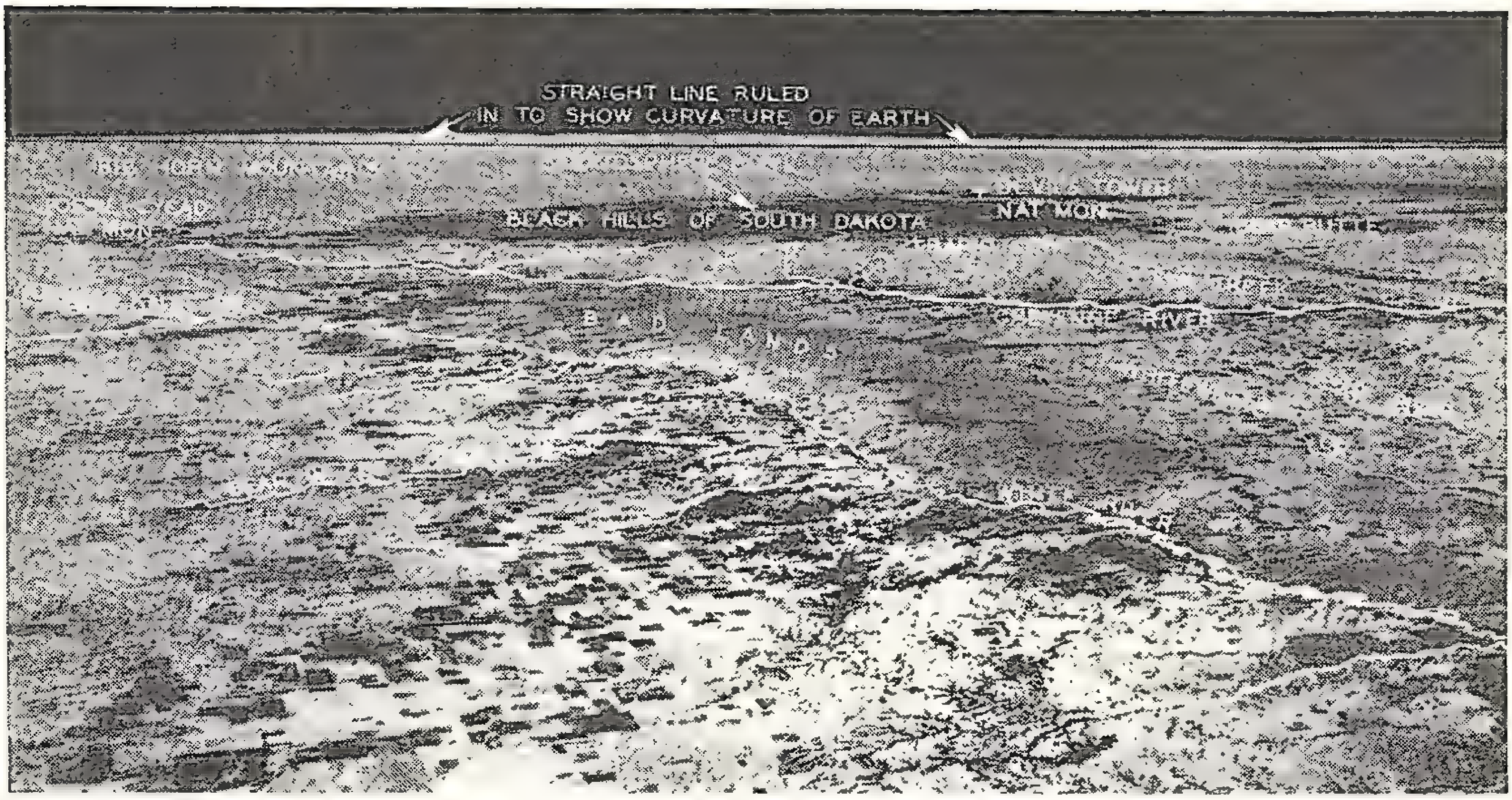


Photo copyrighted by National Geographic Magazine

This photograph, taken from the highest point ever reached by man, clearly reveals the curvature of the earth, as shown by the ruled line and the curve of the horizon, 330 miles away. The photo was taken from the stratosphere balloon *Explorer II* when it reached an altitude of 72,395 feet. A special filter and an infra-red sensitive film was used. The nearest objects in the foreground are 30 miles away. The Black Hills, shown as a dark patch in upper center, are from 120 to 180 miles away.

THE greatest photograph ever taken with a single lens, covering an area larger than the State of Indiana, has just been released by the National Geographic Society. The masterpiece of photographic art was taken by Capt. Albert Stevens from the gondola of the stratosphere balloon *Explorer II* when it reached an altitude of 72,395 feet on the recent National Geographic-U. S. Army Air Corps stratosphere flight from the Black Hills of South Dakota.

For the first time scientists, by means of this photograph, are able to study the lines of demarkation between the troposphere and the stratosphere. The troposphere is the body of dust-laden shifting air currents which blanket the earth, often to a depth of 37,000 feet or more, while the stratosphere is the region of calm air and constant cold.

The photograph was taken from a position about 35 miles south of Murdo, S. Dak., and shows the jagged, snow capped peaks of Montana and Wyoming as a smooth, curving line on the horizon, 330 miles away. A hazy line above the horizon marks the end of the troposphere. Nearly 96 per cent of the earth's atmosphere was below the camera when the picture was snapped. For that reason the sky appears absolutely black. The closest land in the foreground lies 30 miles away.

Scrap Iron Pays For Political Race

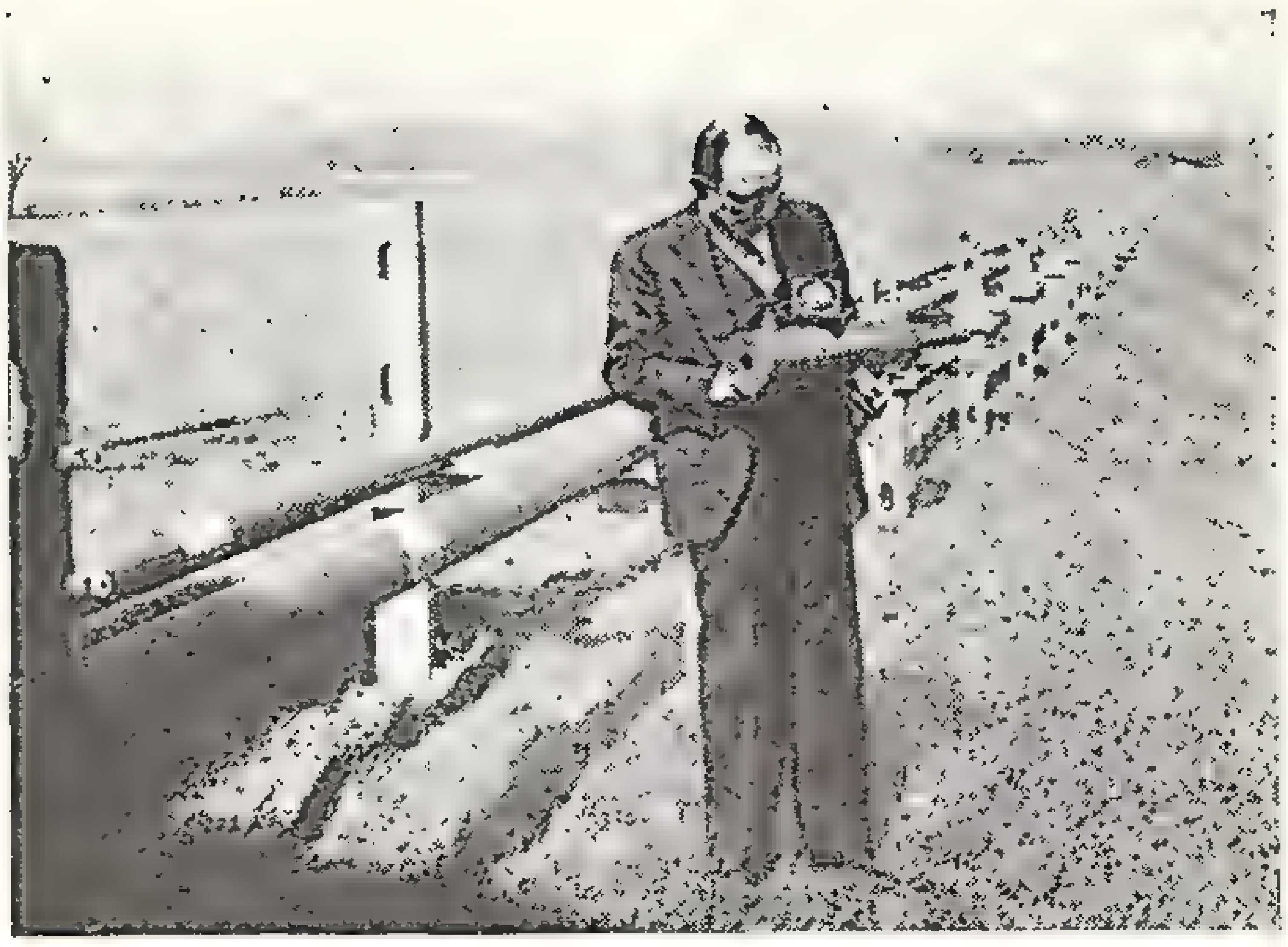
MECHANICAL ability is seldom called upon to play a part in politics, but in the instance of Arch Campbell, of Mankato, Minn., a knowledge of machinery is directly responsible for his becoming a Republican candidate for Congress. Junked automobiles, worn out machinery, and salvaged scrap iron provided Mr. Campbell with the funds for his filing fee. In his iron reclamation shop, useless material is made as good as new. He is an expert in all forms of metal working.

Arch Campbell, of Mankato, Minn., is putting his mechanical ability to work in politics. By reclaiming iron from old cars and machinery he is financing his campaign for Republican Congressman. Recently his scrap iron paid for his filing fee.

Radio Waves Piped In Tube; Big Aid To Television Seen

PIPE lines through which ultra-high frequency radio waves flow with the speed of light have been developed simultaneously by the Bell Laboratories and the Massachusetts Institute of Technology. The pipe line carries electricity in much the same manner as a speaking tube carries the voice.

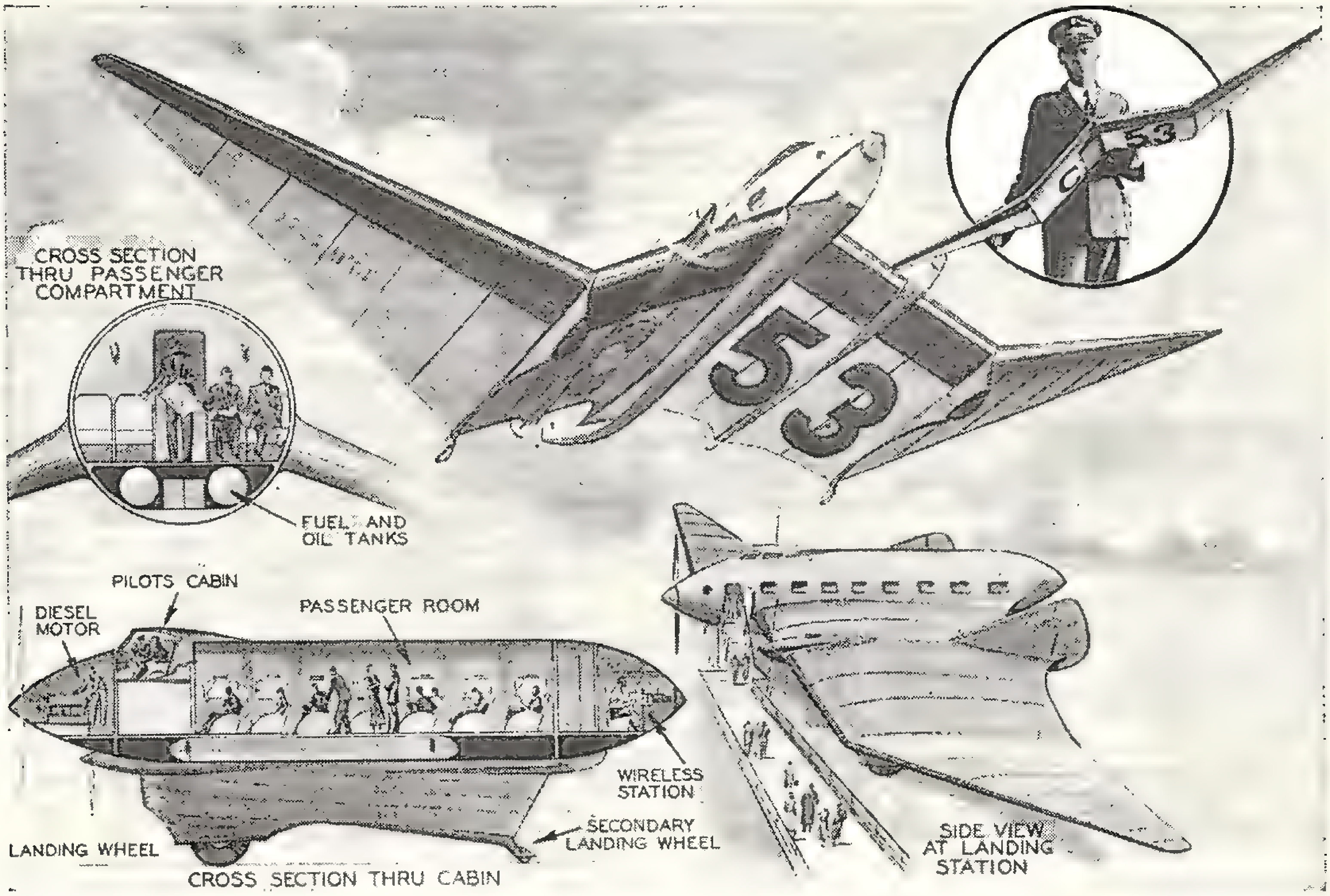
Instead of traveling through the metal of the pipe, the waves are conducted through a thin layer of insulating material inside the tube, free of external interference and static. Possibilities of using the pipe line for transmitting television signals are now being investigated.



Dr. George C. Southworth is shown here inspecting his pipeline system for conducting ultra-high frequency radio waves. Waves pass through pipes like sound through a speaking tube.

Odd-shaped "Flying Wing" Is Model For Proposed Sky Liner

KONRAD KRAFT, a young engineer of Thuringia, Germany, has invented a radically new type of airplane in which the wing surface is broken into the form of a W for greater stability in flight. Using a model with a wing span of 2,200 millimeters and a depth of but 280 millimeters Kraft proved that his design was not affected by side winds, and would climb more rapidly than other models. He plans to use his design for a great tri-motored plane having landing wheels in the wing angles and a roomy passenger compartment between the wings. Fuel would be carried in tanks in the hull.

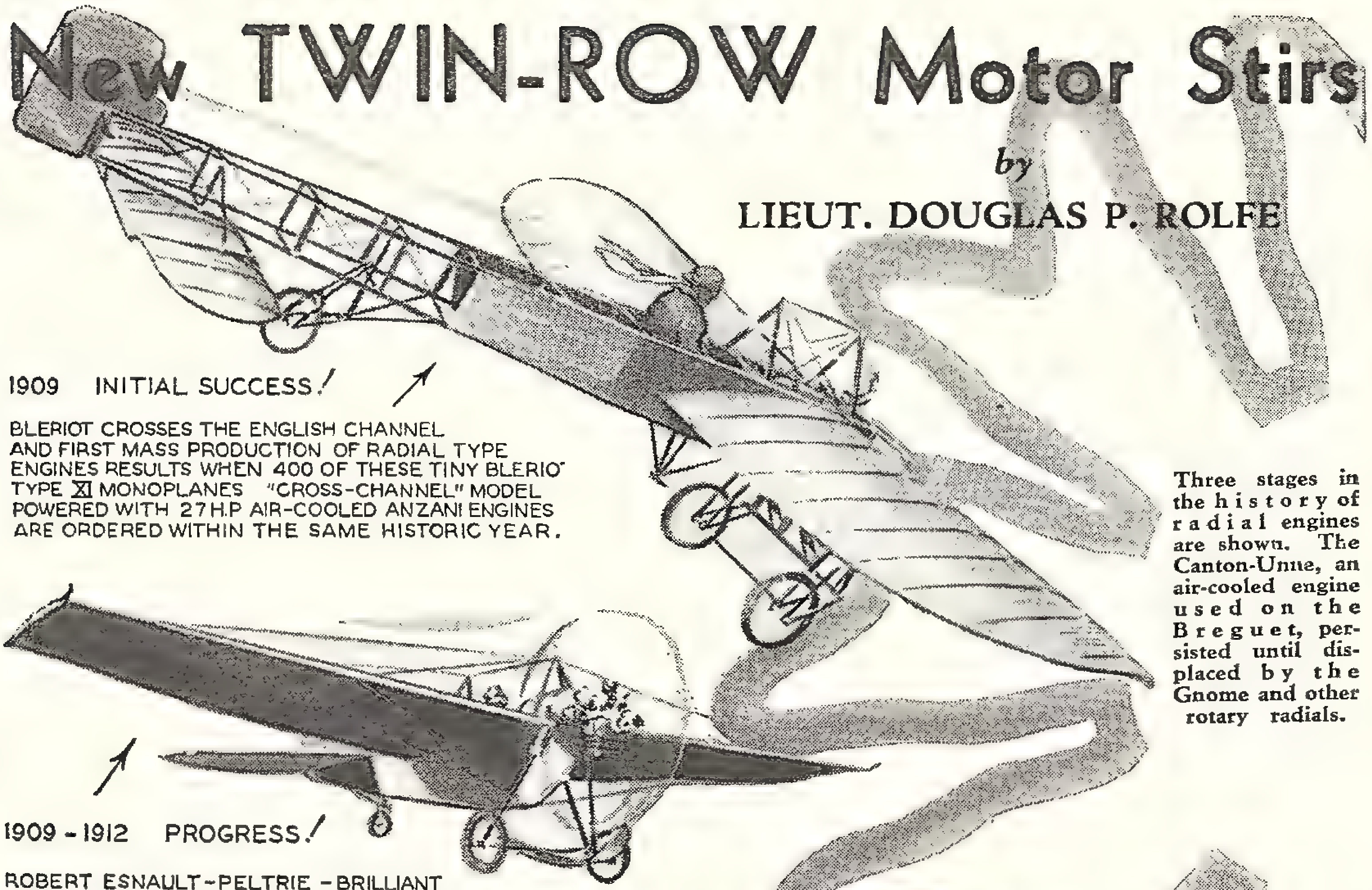

CROSS SECTION THRU PASSENGER COMPARTMENT
FUEL AND OIL TANKS
PILOTS CABIN
DIESEL MOTOR
PASSENGER ROOM
WIRELESS STATION
SECONDARY LANDING WHEEL
LANDING WHEEL
CROSS SECTION THRU CABIN
SIDE VIEW AT LANDING STATION
53
C 53

Konrad Kraft, shown at upper right with his model, is the designer of this proposed "Flying Wing" air giant. Tests with his model have proven it to be unaffected by side winds because of angular construction of wings. It is also reported to require less space for taking off. Drawings show the arrangements of motors, cabins, landing gear and rudders of proposed sky liner.

New TWIN-ROW Motor Stirs

by

LIEUT. DOUGLAS P. ROLFE



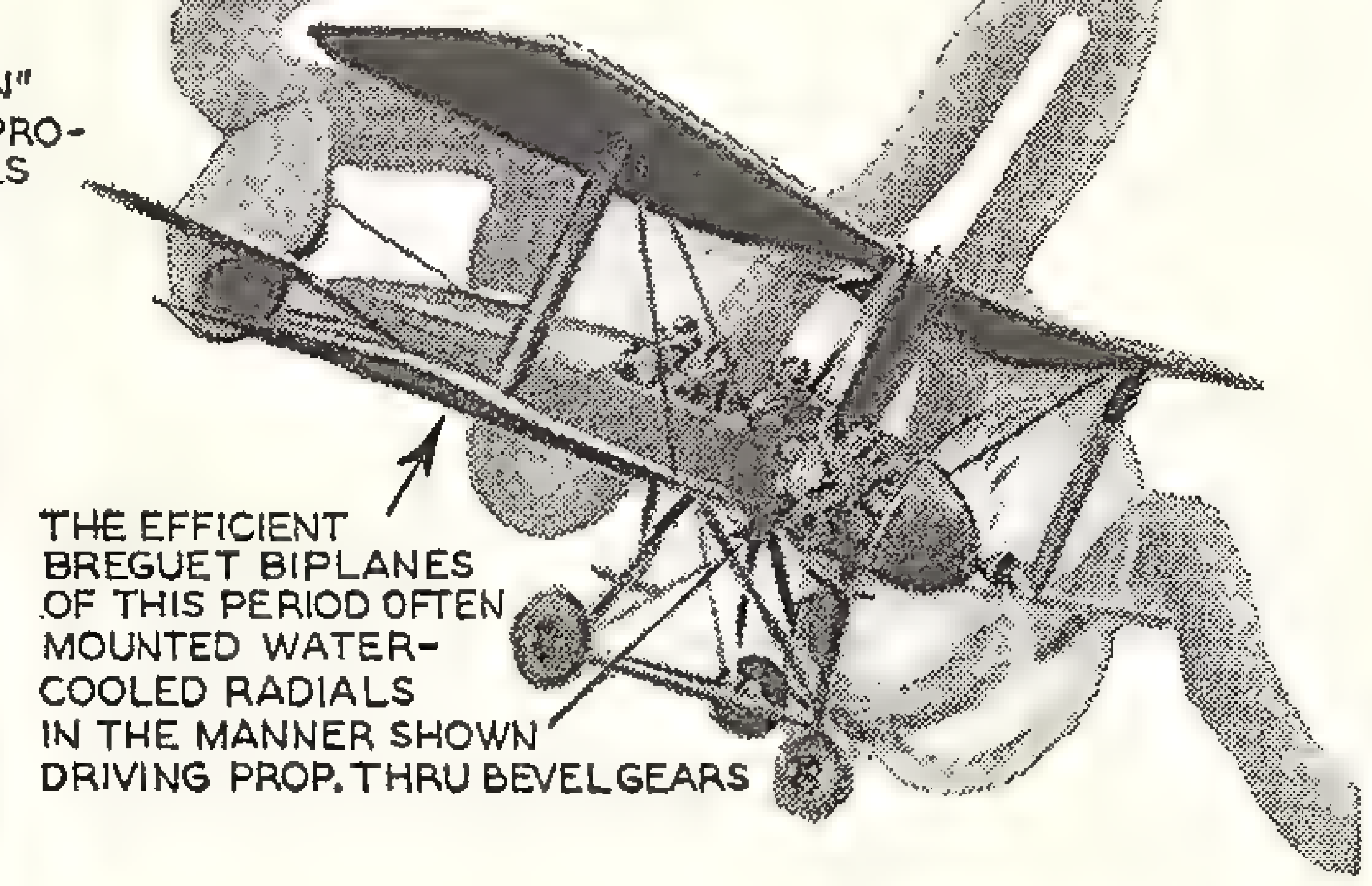
1909 INITIAL SUCCESS

BLERIOT CROSSES THE ENGLISH CHANNEL AND FIRST MASS PRODUCTION OF RADIAL TYPE ENGINES RESULTS WHEN 400 OF THESE TINY BLERIOT TYPE XI MONOPLANES "CROSS-CHANNEL" MODEL POWERED WITH 27 H.P AIR-COOLED ANZANI ENGINES ARE ORDERED WITHIN THE SAME HISTORIC YEAR.

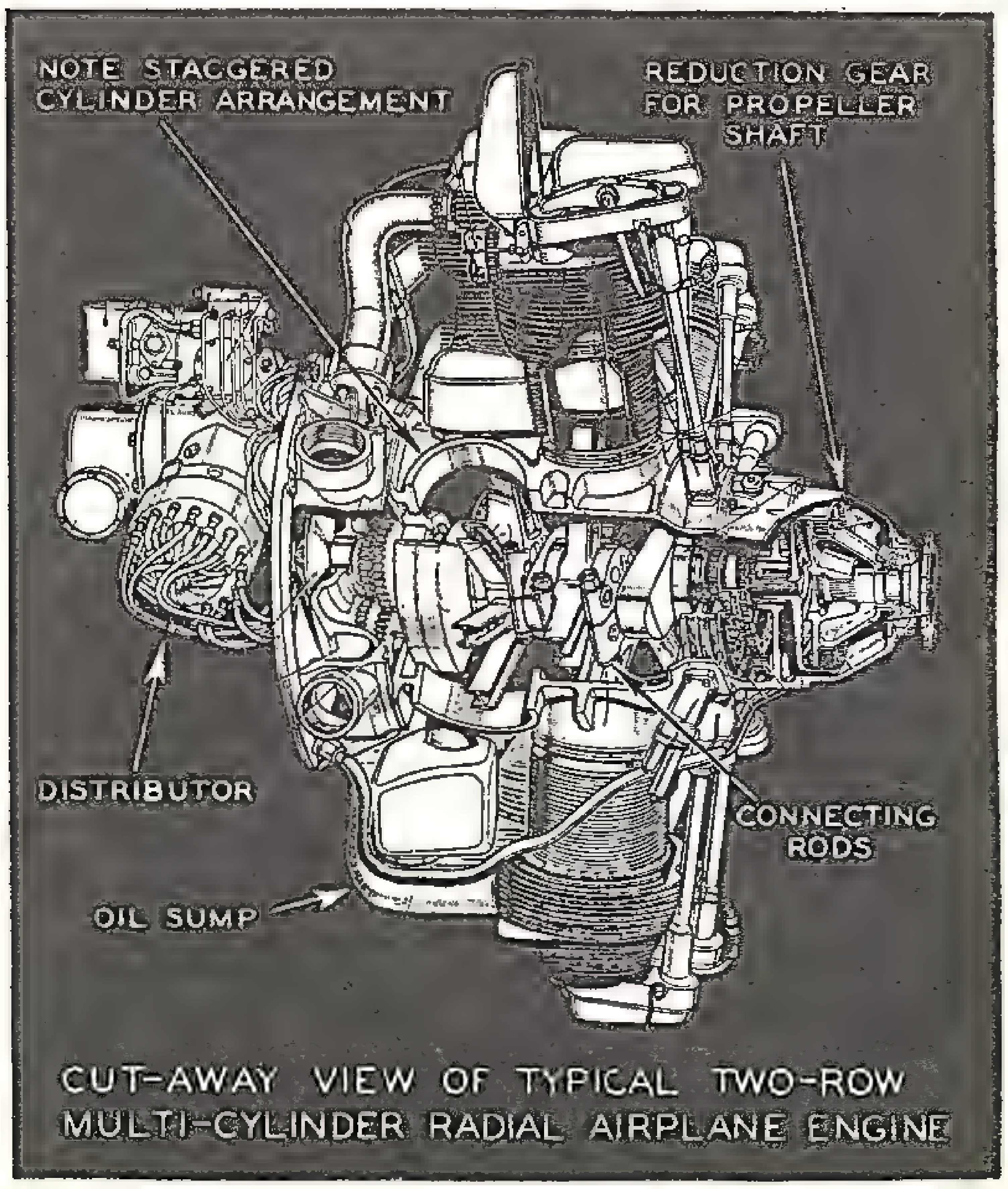
1909 - 1912 PROGRESS

ROBERT ESNAULT-PELTRIE - BRILLIANT FRENCH AERONAUTICAL ENGINEER AND EARLY EXPONENT OF STEEL TUBE CONSTRUCTION INTRODUCES THE "FAN" TYPE RADIAL, AND LIKE BREGUET *(CONTEMPORARY AND OF EQUAL FAME)*, PRODUCES A SERIES OF PLANES POWERED EXCLUSIVELY WITH RADIALS

Three stages in the history of radial engines are shown. The Canton-Unne, an air-cooled engine used on the Breguet, persisted until displaced by the Gnome and other rotary radials.



THE EFFICIENT BREGUET BIPLANES OF THIS PERIOD OFTEN MOUNTED WATER-COOLED RADIALS IN THE MANNER SHOWN DRIVING PROP. THRU BEVEL GEARS


NOTE STAGGERED CYLINDER ARRANGEMENT
REDUCTION GEAR FOR PROPELLER SHAFT
DISTRIBUTOR
CONNECTING RODS
OIL SUMP

CUT-AWAY VIEW OF TYPICAL TWO-ROW MULTI-CYLINDER RADIAL AIRPLANE ENGINE

This particular engine has a reduction gear to the propeller shaft. Note the overall length of the motor. Bleriot's first flight across the English Channel gave the radial air engine its first impetus. The immediate result of his venture was the sale of hundreds of the Type XI or Cross-Channel model. Equipped with three-cylinder, air-cooled Anzani radials, these little ships were soon flying all over the world. The light rotary radial followed and persisted until after the World War. By 1920, there was a swing to "in line" and "V" engines.

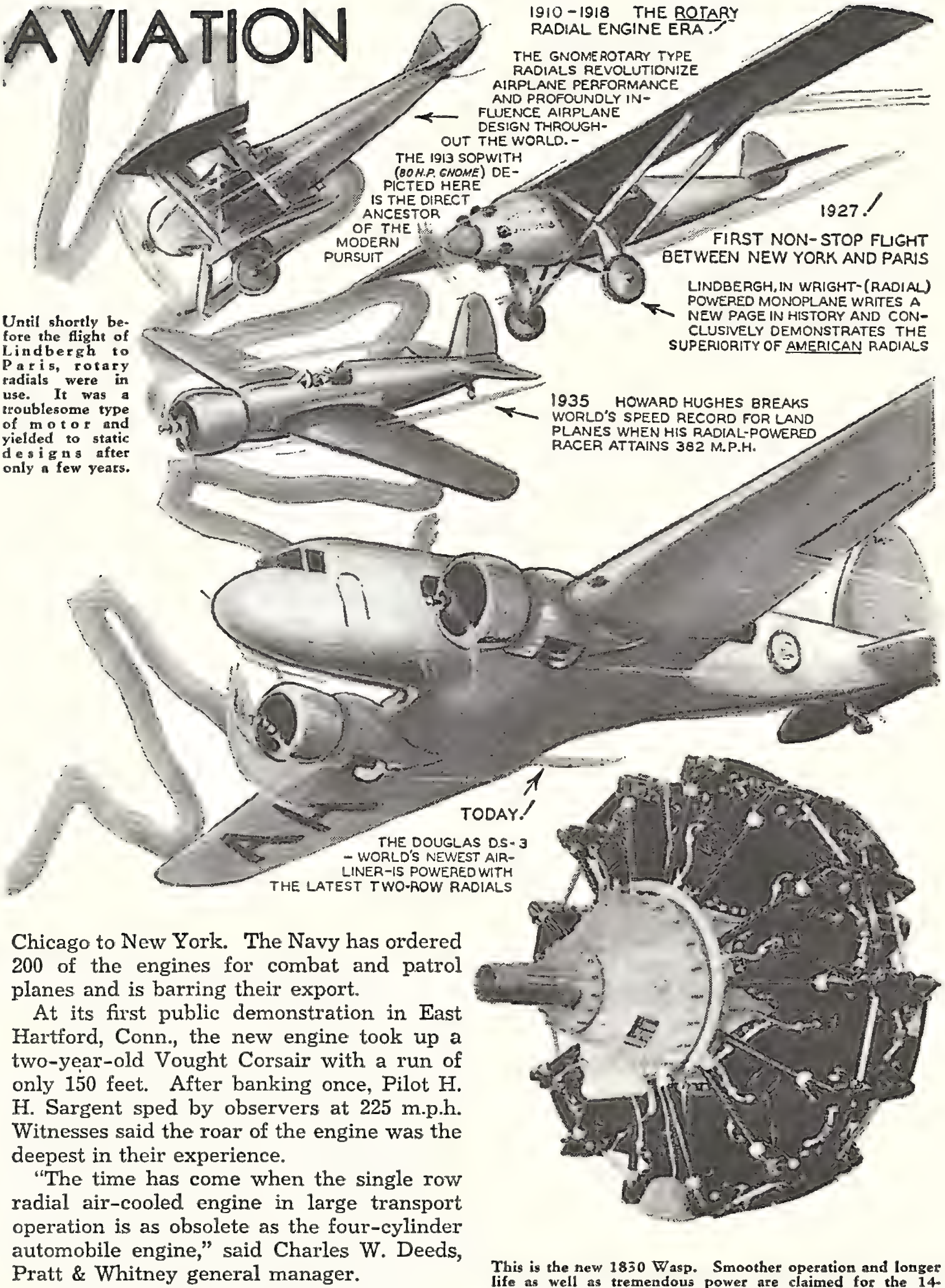
TWENTY-SIX Twin Wasp engines of 1,000 horsepower will begin service in July on air liners as the latest triumph in radial engine design.

A far cry from the three-cylinder radial motor which bore Louis Bleriot over the English Channel in 1909, the new engines are described as the mightiest yet built for regular service.

The new air-cooled engine is the 1,830 Wasp of Pratt & Whitney. The 14 cylinders are in two circles, one behind the other. Normal power maximum is 1,000 h.p. with an emergency maximum of 1,150 h.p. Weighing 1,250 lbs., the motor develops, at sea level, a horsepower for each 1.09 lbs.

It will enable the Douglas DC-3's of the United Airlines to cruise at over 200 miles per hour and to fly non-stop from San Francisco to Salt Lake, Salt Lake to Chicago, and

AVIATION


1910 - 1918 THE ROTARY RADIAL ENGINE ERA.
THE GNOMEROTARY TYPE RADIALS REVOLUTIONIZE AIRPLANE PERFORMANCE AND PROFOUNDLY INFLUENCE AIRPLANE DESIGN THROUGHOUT THE WORLD. - THE 1913 SOPWITH (80 H.P. GNOME) DEPICTED HERE IS THE DIRECT ANCESTOR OF THE MODERN PURSUIT
1927.
FIRST NON-STOP FLIGHT BETWEEN NEW YORK AND PARIS
LINDBERGH, IN WRIGHT-(RADIAL) POWERED MONOPLANE WRITES A NEW PAGE IN HISTORY AND CONCLUSIVELY DEMONSTRATES THE SUPERIORITY OF AMERICAN RADIALS
1935 HOWARD HUGHES BREAKS WORLD'S SPEED RECORD FOR LAND PLANES WHEN HIS RADIAL-POWERED RACER ATTAINS 382 M.P.H.
TODAY.
THE DOUGLAS DS-3 - WORLD'S NEWEST AIR-LINER-IS POWERED WITH THE LATEST TWO-ROW RADIALS

Until shortly before the flight of Lindbergh to Paris, rotary radials were in use. It was a troublesome type of motor and yielded to static designs after only a few years.

Chicago to New York. The Navy has ordered 200 of the engines for combat and patrol planes and is barring their export.

At its first public demonstration in East Hartford, Conn., the new engine took up a two-year-old Vought Corsair with a run of only 150 feet. After banking once, Pilot H. H. Sargent sped by observers at 225 m.p.h. Witnesses said the roar of the engine was the deepest in their experience.

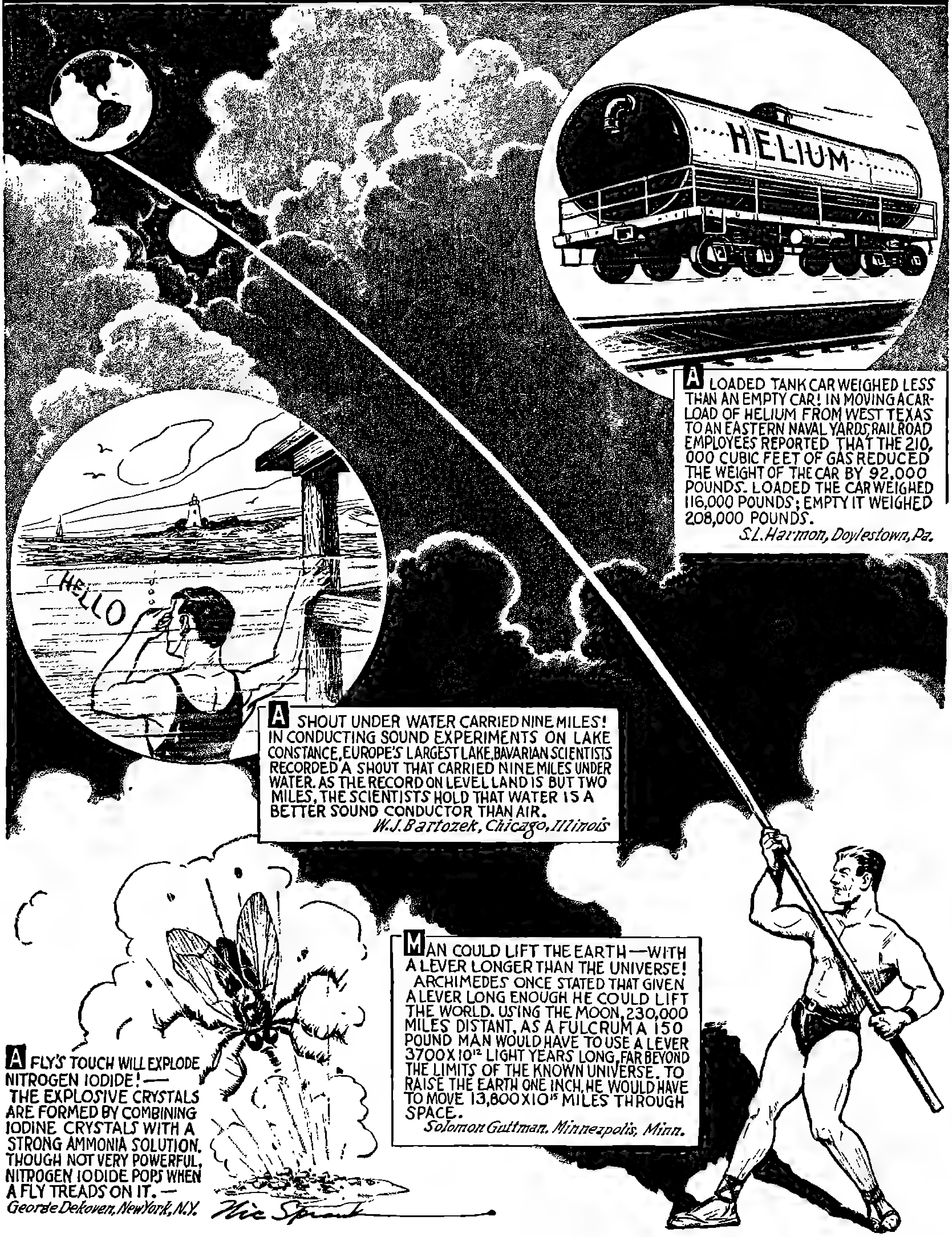
"The time has come when the single row radial air-cooled engine in large transport operation is as obsolete as the four-cylinder automobile engine," said Charles W. Deeds, Pratt & Whitney general manager.

The new engine is the result of experimentation which began in 1929 when Pratt & Whitney engineers became convinced that the economical power limit of the normal nine-cylinder radial engine had been reached.

This is the new 1830 Wasp. Smoother operation and longer life as well as tremendous power are claimed for the 14-cylinder two row design. There are 250 light impulses per second from a 5 ½-inch cylinder at cruising horsepower. The combination of high crankspeeds with comparatively small cylinders permits a greater mean effective pressure with any given fuel. More power for a given displacement can be obtained. Automatic valve gear lubrication and mixture control and 21,000 square inches of cooling surface are features.

Average MAN Could Lift The WORLD

Nic Sprank Offers $5 for Best Oddity



A LOADED TANK CAR WEIGHED LESS THAN AN EMPTY CAR! IN MOVING A CAR-LOAD OF HELIUM FROM WEST TEXAS TO AN EASTERN NAVAL YARDS, RAILROAD EMPLOYEES REPORTED THAT THE 210,000 CUBIC FEET OF GAS REDUCED THE WEIGHT OF THE CAR BY 92,000 POUNDS. LOADED THE CAR WEIGHED 116,000 POUNDS; EMPTY IT WEIGHED 208,000 POUNDS.

S.L. Harmon, Doylestown, Pa.

A SHOUT UNDER WATER CARRIED NINE MILES! IN CONDUCTING SOUND EXPERIMENTS ON LAKE CONSTANCE, EUROPE'S LARGEST LAKE, BAVARIAN SCIENTISTS RECORDED A SHOUT THAT CARRIED NINE MILES UNDER WATER. AS THE RECORD ON LEVEL LAND IS BUT TWO MILES, THE SCIENTISTS HOLD THAT WATER IS A BETTER SOUND CONDUCTOR THAN AIR.

W.J. Bartozek, Chicago, Illinois

MAN COULD LIFT THE EARTH—WITH A LEVER LONGER THAN THE UNIVERSE! ARCHIMEDES ONCE STATED THAT GIVEN A LEVER LONG ENOUGH HE COULD LIFT THE WORLD. USING THE MOON, 230,000 MILES DISTANT, AS A FULCRUM A 150 POUND MAN WOULD HAVE TO USE A LEVER 3700×10^{12} LIGHT YEARS LONG, FAR BEYOND THE LIMITS OF THE KNOWN UNIVERSE. TO RAISE THE EARTH ONE INCH, HE WOULD HAVE TO MOVE $13{,}800 \times 10^{15}$ MILES THROUGH SPACE.

Solomon Guttman, Minneapolis, Minn.

A FLY'S TOUCH WILL EXPLODE NITROGEN IODIDE!—THE EXPLOSIVE CRYSTALS ARE FORMED BY COMBINING IODINE CRYSTALS WITH A STRONG AMMONIA SOLUTION. THOUGH NOT VERY POWERFUL, NITROGEN IODIDE POPS WHEN A FLY TREADS ON IT.—

George Dekoven, New York, N.Y.

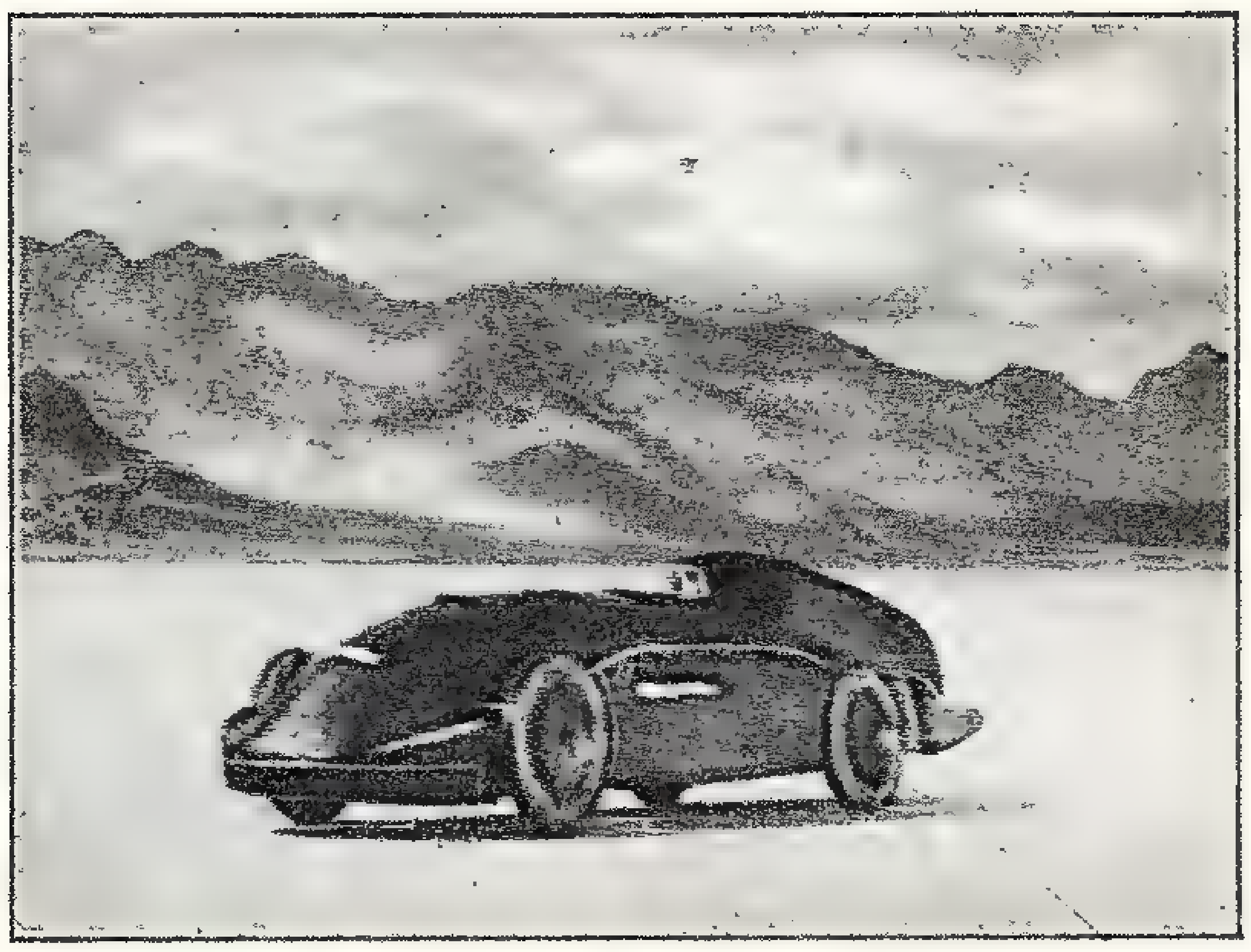
Nic Sprank

Five dollars will be paid for the Oddity used by Nic Sprank as his central illustration. One dollar will be paid for all others used on this page. Send your Oddity to Nic Sprank, Modern Mechanix Publishing Company, Fawcett Bldg., Greenwich, Conn. Source or proof of each Oddity must be given. Send all Oddities separately, not with other manuscripts or letters.

Capt. Eyston Sets 158 M.P.H. Record In Diesel-Powered Car

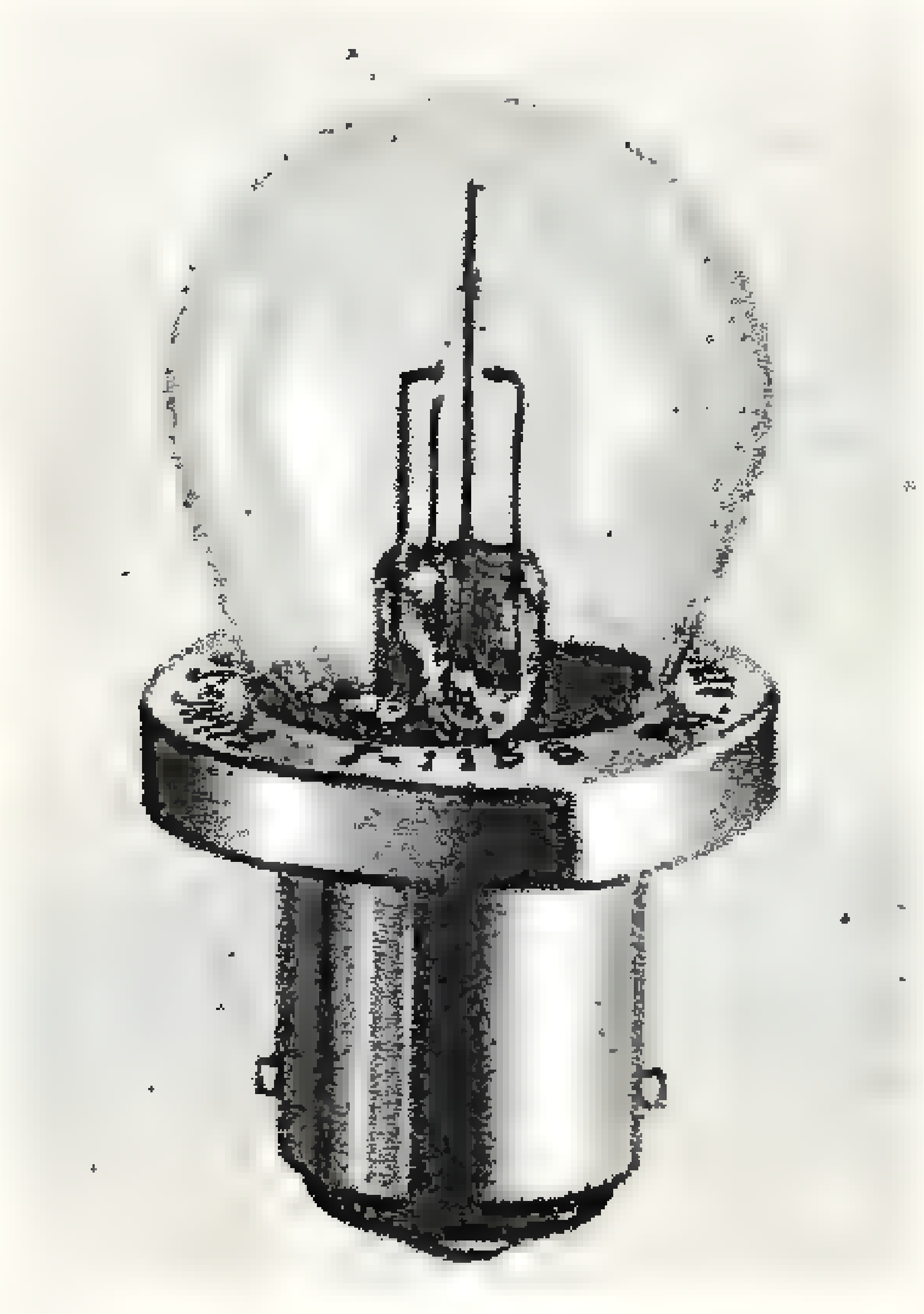
HURTLING over the Bonneville Salt Flats at 158 miles an hour, Capt. George Eyston of London, England, was successful in setting a new world's speed record for Diesel powered racing cars.

Captain Eyston drove his streamlined Flying Spray over a seven-mile straightaway. The first three miles were for building up speed, the fourth was the measured mile, and the last three were for slowing down. On three runs he made 155 m.p.h., 158, and 153.



This remarkable action photo caught Capt. George Eyston just as he flashed into the measured mile where he set a new world record for Diesel powered automobiles of 158 m.p.h.

Flicker Bulb Is Self-Contained



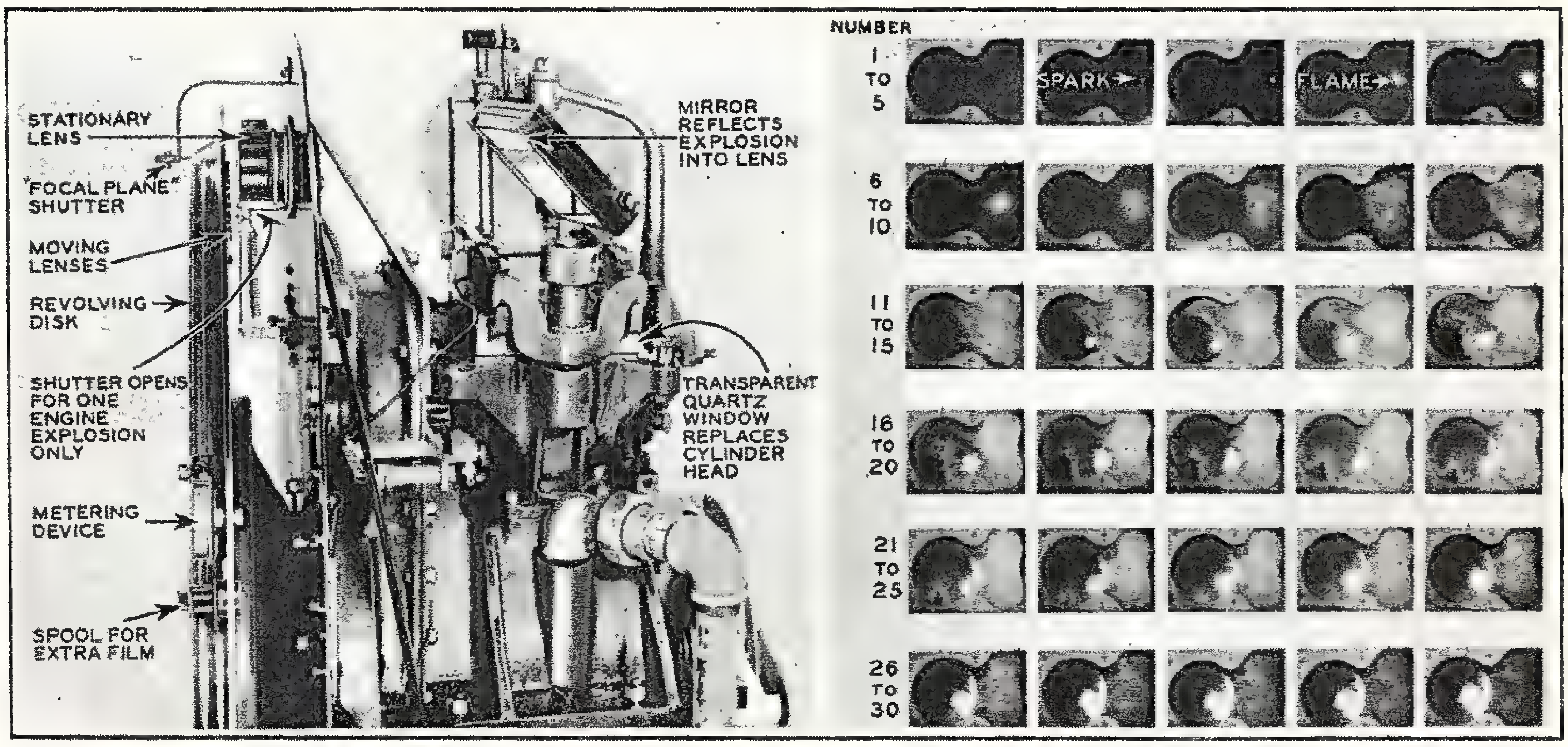
This small traffic bulb flashes at a constant rate of speed without any additional mechanism.

THE elaborate mechanism necessary to keep a traffic warning light flickering on and off is dispensed with in a new type bulb which contains its own flicker mechanism in its base. It is simply installed in its socket where it flashes constantly.

Camera Pictures Motor Explosions

MOVIE film speeding through a highly specialized camera at 250 miles per hour is now enabling engineers for the first time to photograph the explosion of gasoline in an automobile engine. One explosion lasts less than 1/250th of a second, during which time the camera makes 30 perfect pictures at the rate of 5,000 a second.

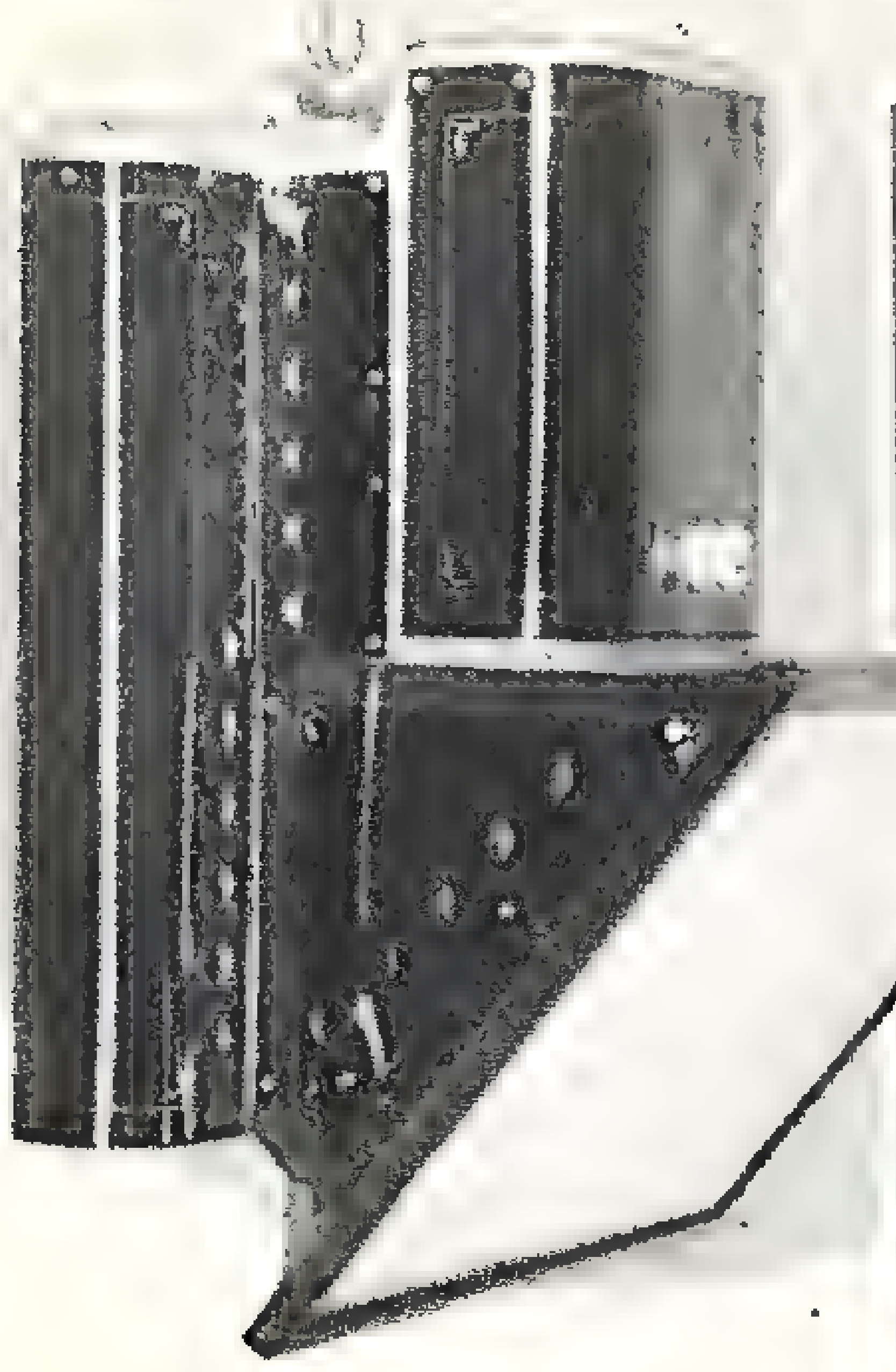
The explosion is made visible by a fused quartz cylinder head. The secret of the high-speed camera is in the revolving lenses which rotate at the same speed as the film.



STATIONARY LENS
"FOCAL PLANE" SHUTTER
MOVING LENSES
REVOLVING DISK
SHUTTER OPENS FOR ONE ENGINE EXPLOSION ONLY
METERING DEVICE
SPOOL FOR EXTRA FILM
MIRROR REFLECTS EXPLOSION INTO LENS
TRANSPARENT QUARTZ WINDOW REPLACES CYLINDER HEAD
NUMBER
1 TO 5
SPARK
FLAME
6 TO 10
11 TO 15
16 TO 20
21 TO 25
26 TO 30

This is the 5,000-picture-a-second camera used in photographing motor combustion. As the explosion takes place beneath the quartz cylinder head, its action is reflected by mirror into a stationary lens and a disk of smaller lenses. At right are thirty pictures of a single explosion in an engine running at 2,000 r. p. m. All thirty pictures were exposed in 6/1,000 of a second. Arrow shows ignition spark in exposure two and flame of explosion starts in exposure four, progressing as shown.

LIGHTING THE WAY



The naturalness of color movies is largely dependent upon great quantities of light. This "broad" arc light serves for general illumination. About twenty-five lights such as this are needed for each color scene.

Charles Collins and Steffi Duna in an action scene for "Dancing Pirates", the latest indoor color film. Note the lights at top of set. Each one of which emits more than 250,000,000 candlepower.

BEHIND the fascinating natural color motion pictures that are sweeping the country there lies a story of astonishing developments as spectacular in their field as the color movies themselves.

Let's visit the huge Stage 8 at United Artists where Pioneer Productions filmed a dance sequence for "Dancing Pirate," and observe the new mechanical equipment and new technique being employed in order to bring a color film to the screen that has coloring as vivid as nature herself.

Because everyone, even in Hollywood, is interested and curious about the equipment and methods employed in making color productions, a uniformed guard at the stage door stops the curious. Even the employees and actors of the studio who are working on other films would "gang-up" on the color setting and interfere with the work.

The first thing noticed that is different from the setting of black and white movie is the great number of lights used. Lighting equipment or "rigging" of great variety is everywhere. Overhead is a solid bank of "broads" which are used for the "filler" or overall illumination. High up on the "parallels," sixty feet up in the roof on the "catwalks," everywhere, on the top the setting and on the floor is lighting paraphernalia used for the special effects and for painting the desired scene. Two or three times more light is required in making a movie in color than one in black and white.

Robert Jones, left, and Lloyd Corrigan, center, are the two men to whom credit must go for the success of "Dancing Pirates". Jones is color designer, and Corrigan the director.

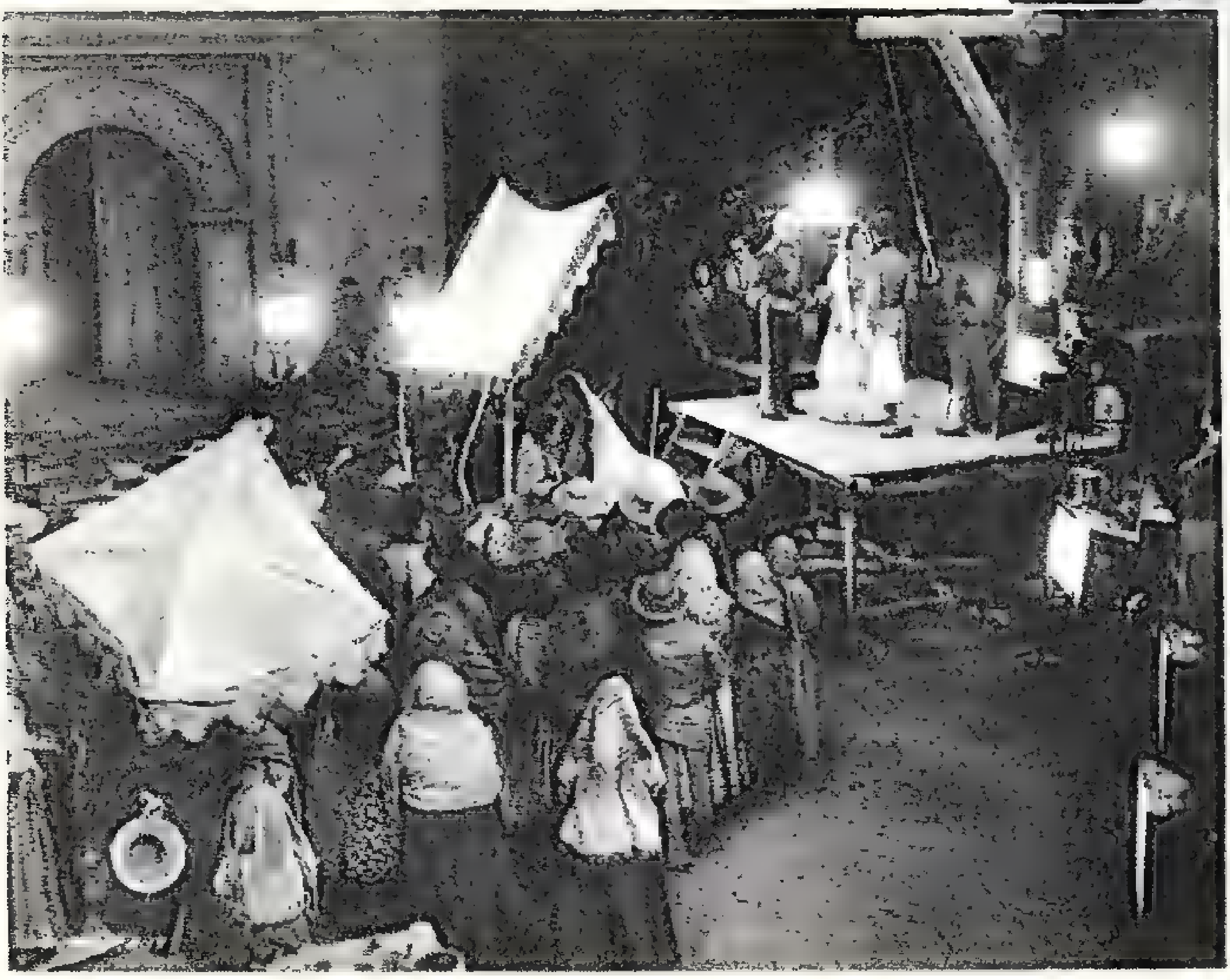
A new type of arc unit, called the "high-arc" has been developed for "Dancing Pirate" which emits 325,000,000 candlepower in a narrow beam. In order to illustrate the amount of heat given off, this arc, which draws 150 amps, if focussed to a narrow beam is capable of almost instantaneously setting a block of wood ablaze at a distance of

FOR COLOR MOVIES

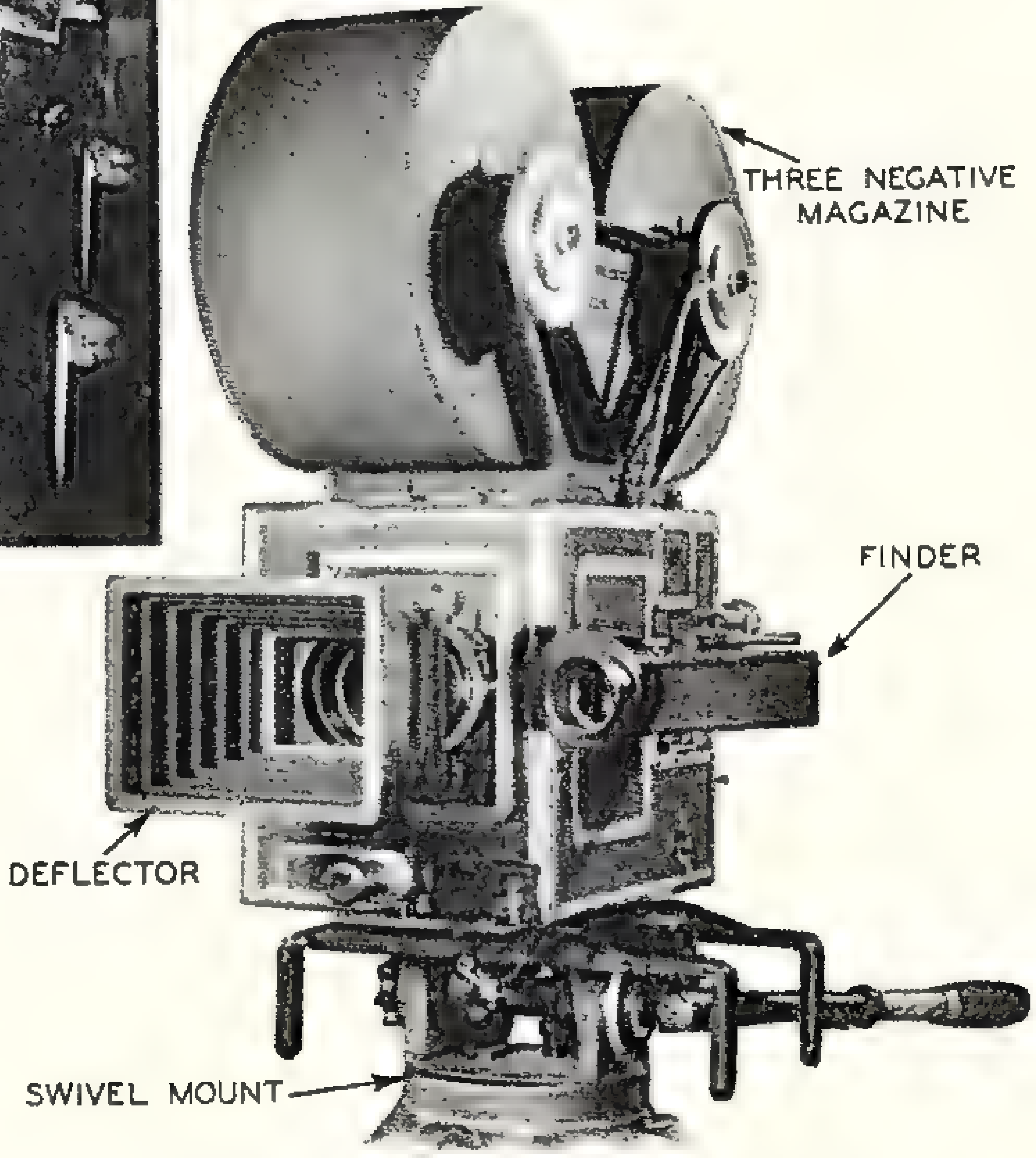
by EARL THIESEN

Fascinating as the miracle of color is upon the screen, it proves even more fascinating when one steps "behind the scenes". The new, novel equipment in use, the lights, and the cameras are fully described in this exclusive article.

From a "parallel" above the set the cameraman and his crew shoot a "high" scene. The microphone in the cameraman's hand is for broadcasting instructions during rehearsals.



In this "behind the scenes" photo of a color movie in the making one can see how the lights are arranged to shine with extra brilliance upon the gallows in the center. This immediately but unnoticeably attracts the eye to the center of action.



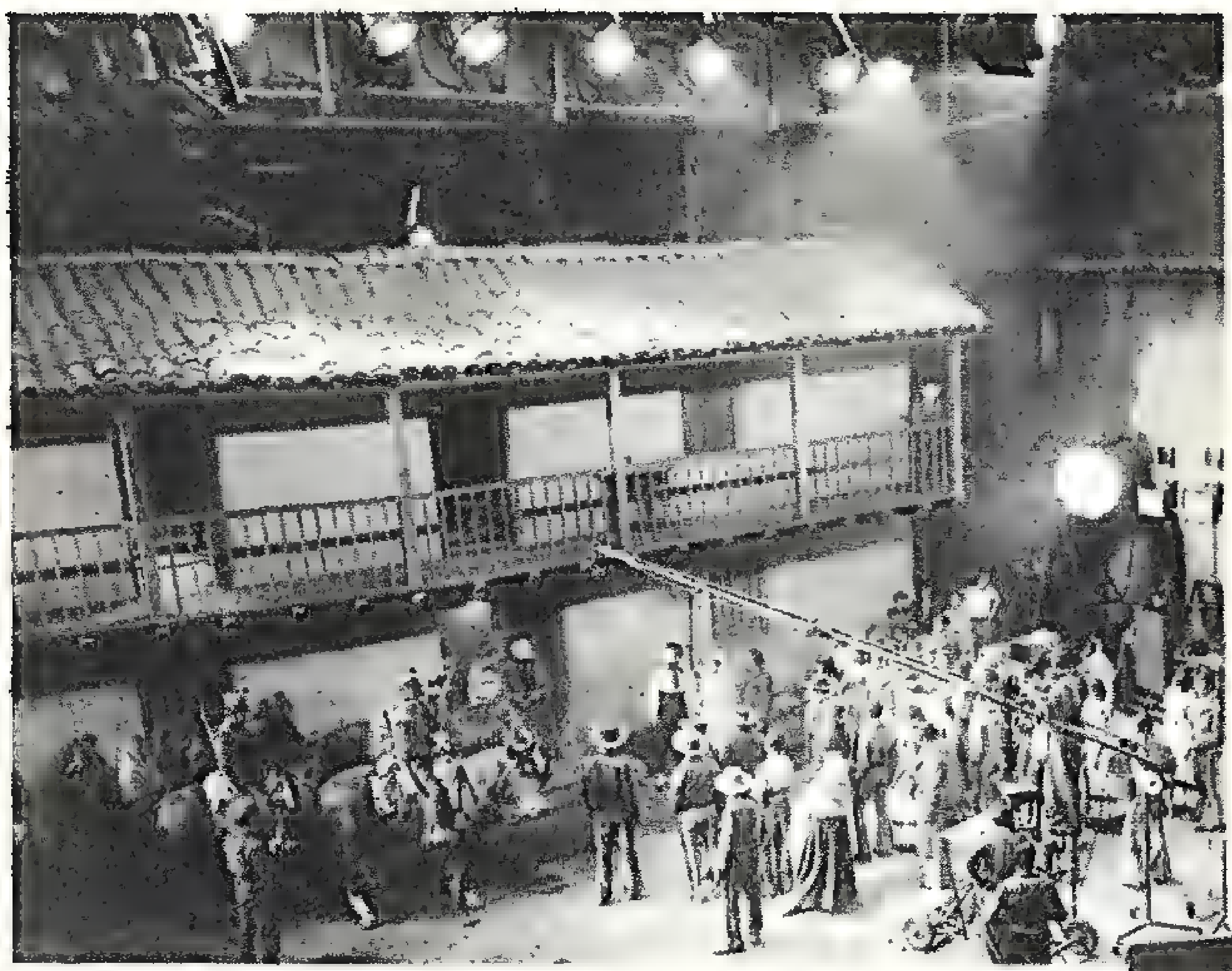
Here is a front view of the three-color Technicolor camera. In the magazine are three negatives side by side. One negative records red-orange, another blue-green, the third, yellow. A prism behind the single lens divides light rays into colors.

twenty feet. Twenty-two of these powerful lights, besides fifty-six units of less capacity, were set up for the dance sequence. According to measurements, 16,000 amps were required for a daylight effect on this setting, or enough electricity to light an ordinary town of 10,000 or more inhabitants. It is enough power to illuminate several metropolitan city blocks with all the street signs and office lights. Eight to ten thousand amps, we are told by the "gaffer," the movie name for the electrician, were required on the same setting for a moonlight effect.

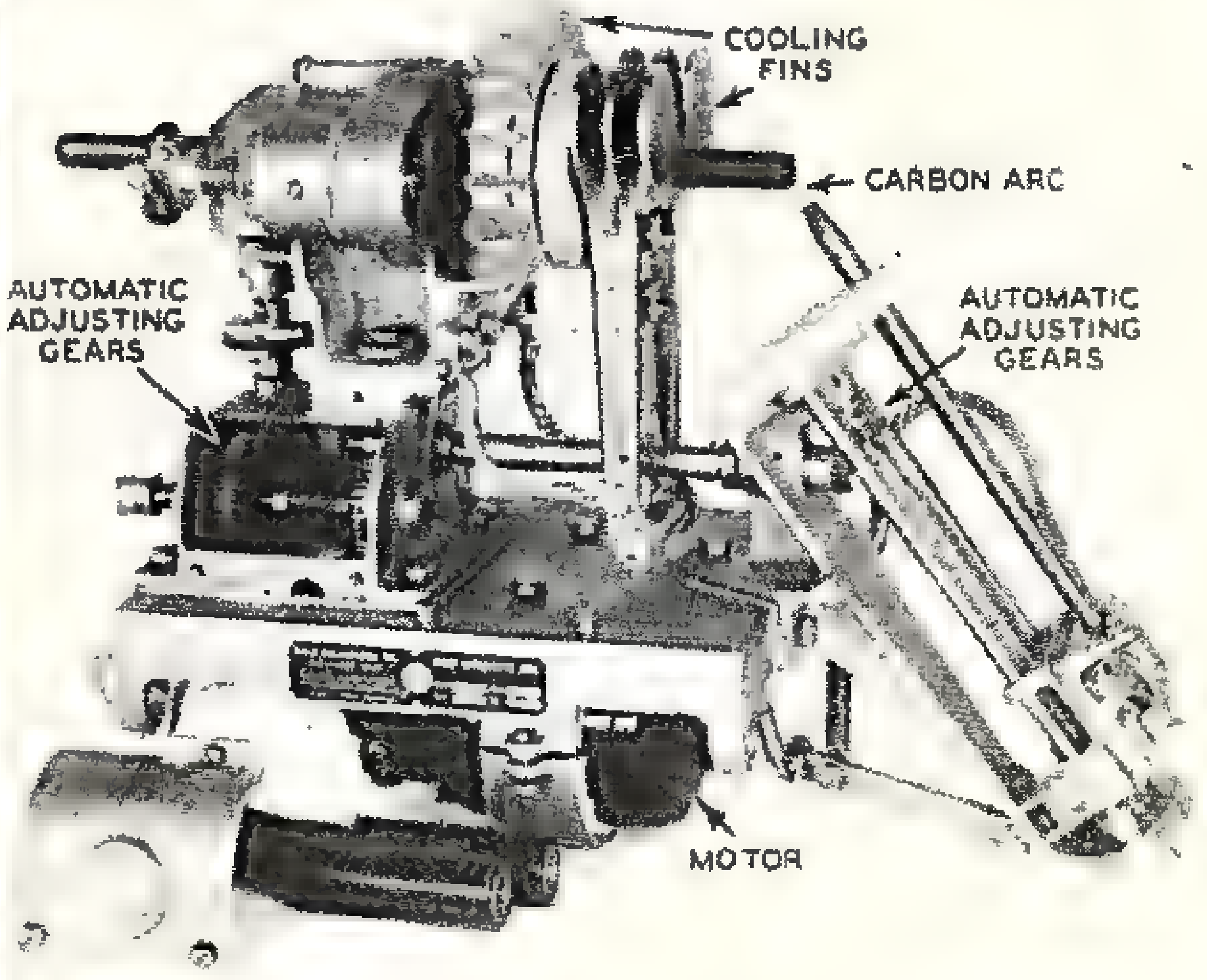
With the older type of "sun-arc" light used in earlier color pictures the eyes of the actors were fatigued and strained and gave what is known in the studios as "kleig-eyes," because of the presence of ultra-violet light. Now, on the new type "high-arc" a special glass filter which contains a metallic salt is used over the front of the light unit which absorbs the ultra-violet. This glass is also framed so it won't break from the heat and drop on the players, while the arc mechanism itself has a metallic insulator of cooling flanges which radiate off the heat.

A new lens, the "Morinc," is used on some

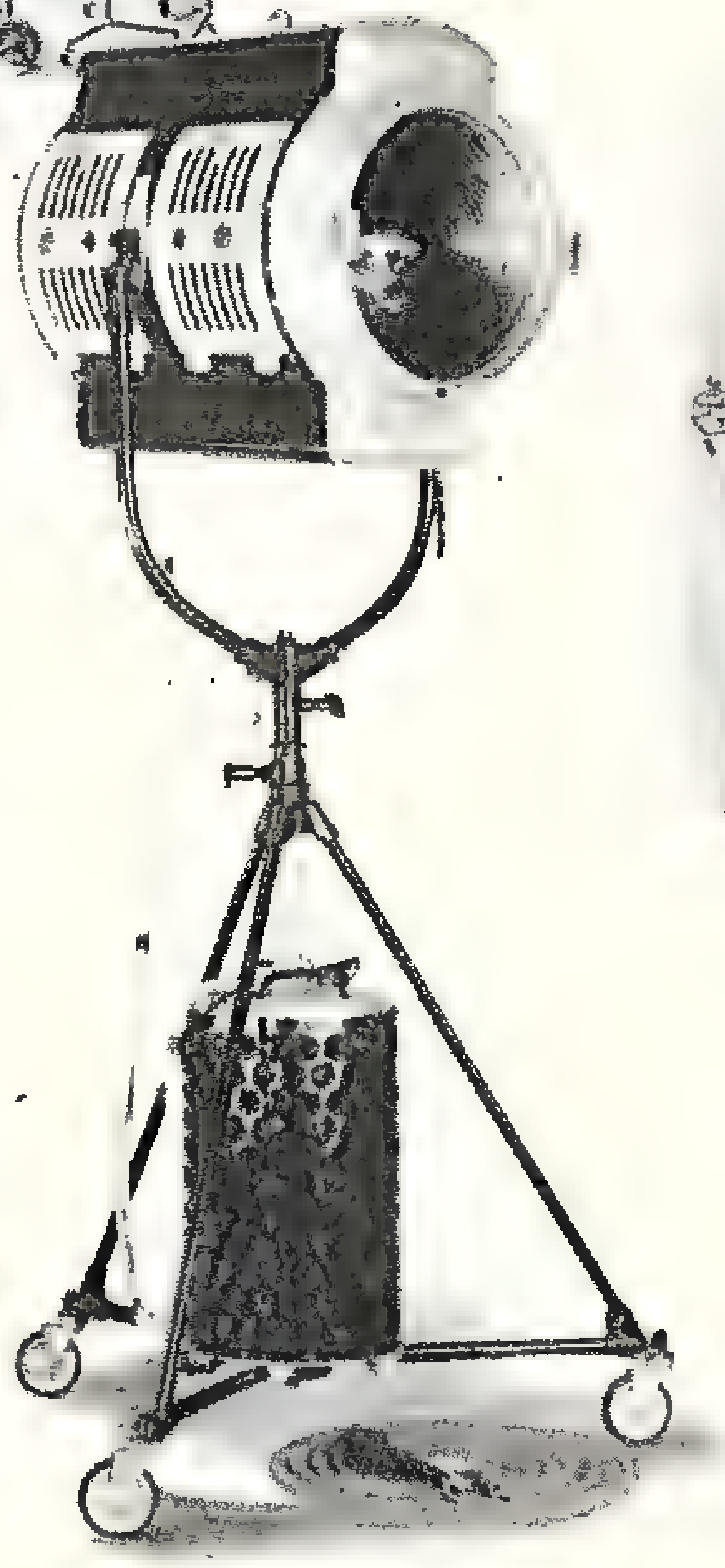
Electricity For One Scene Would Light City



Brilliant sunlight floods this scene, but leaves no dark shadows. It comes from the sun-arc lights shown at top. Enough electricity to light a town of 10,000 inhabitants is consumed by the 22 sun-arcs and 56 smaller units needed.



This is the interior of the sun-arc. The geared motor automatically keeps the carbon arc constant. Special connections keep the arc and motor silent. Earlier arcs were noisy.



Above—The controls of the sun-arc can focus the light on such a small spot it will ignite wood. The numerous controls are essential for accurate lighting. Left—Two men can handle the sun-arc while on earlier models six were required. The lens screens out ultra-violet rays and is similar to those which are used in lighthouses.

of the lights which permits focussing and spreading the light so the center of interest of the picture can be high-lighted. Because the eyes of the audience are drawn to the brightest portion of the scene, the cameraman always lights the scenes so the center of interest is brightest. In other words, the action of the story is framed by a halo of light.

Arc light, called a "cold-light" in the studios because it contains a high content of blue, is used in filming color movies rather than the Mazda Incandescent which is a "warm" or yellowish light. While the incandescent light appears white to the eye, it has the effect of being very yellow in the color processes. The arcs when photographing color give a very close approximation to sunlight.

Mazda illumination was used for the warm yellow light seen streaming through the doors and windows in the moonlight scenes of this picture.

The color of the setting—an outdoor scene with an early Spanish church in the background—is a warm neutral tan-brown, and while the eye cannot detect a certain blue quality to the coloring of the set and its props, blue has been added to the paint used so as to cover a certain deficiency of the Technicolor process which leans to the red and orange in reproducing color. The floor of the sound stage on which this setting stands has been covered with a prop "ground." It looks similar to real dirt but close observation shows it to be a tightly stretched burlap rug that has been dyed a ground color. Real earth could not be used because the feet of

[*Continued on page* 125]

40TH ANNIVERSARY OF MOTION PICTURES

Forty years ago Thomas Edison built a camera and George Eastman produced film for it—and the movies were born. The time was April 23, 1896 and the place, Koster Bial's Music Hall in New York City.

The first showing dominated space in the "New York Herald," which headlined: "Triumph Of The Vitascope. Edison's achievement to Reproduce a play made Pictorially a perfect success. New phonograph coming. Recorded volume of sound will be magnified so each actor's speech will be heard."

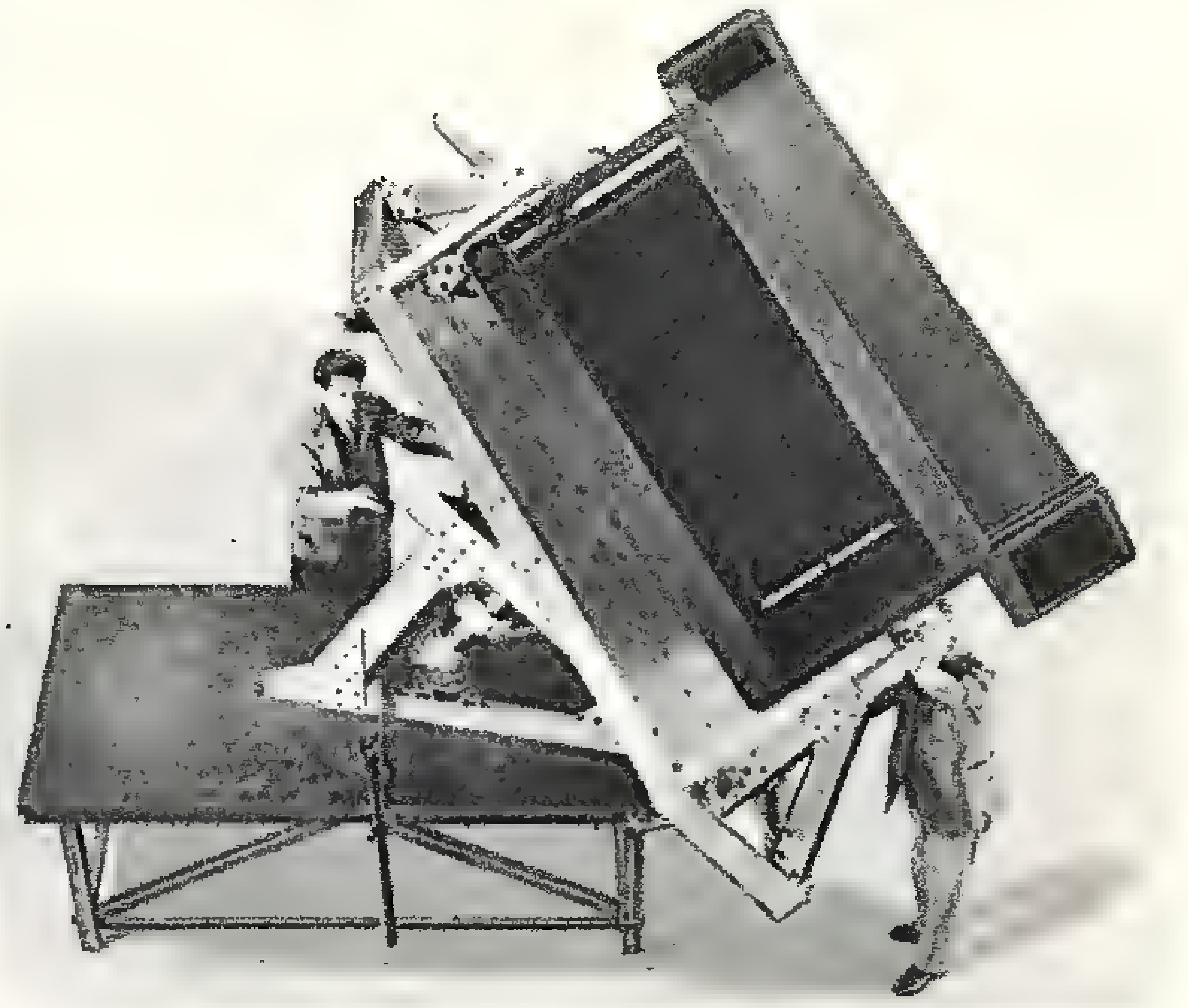
Giant Cameras Photograph Sun's Eclipse On 30-Inch Film

BATTERIES of cameras more elaborate than any yet assembled will be on hand near Ak-Bulak, Siberia, to explore the chemical composition of the chromosphere during a total eclipse of the sun on June 16.

From the United States a joint expedition of Harvard University and the Massachusetts Institute of Technology, headed by Dr. Donald Menzel of the Harvard Observatory, will bring equipment which will automatically record the spectrum of the chromosphere on continuous motion picture film 30 inches wide. Hundreds of still photographs will be taken at one-second intervals for four minutes by 15-foot cameras.

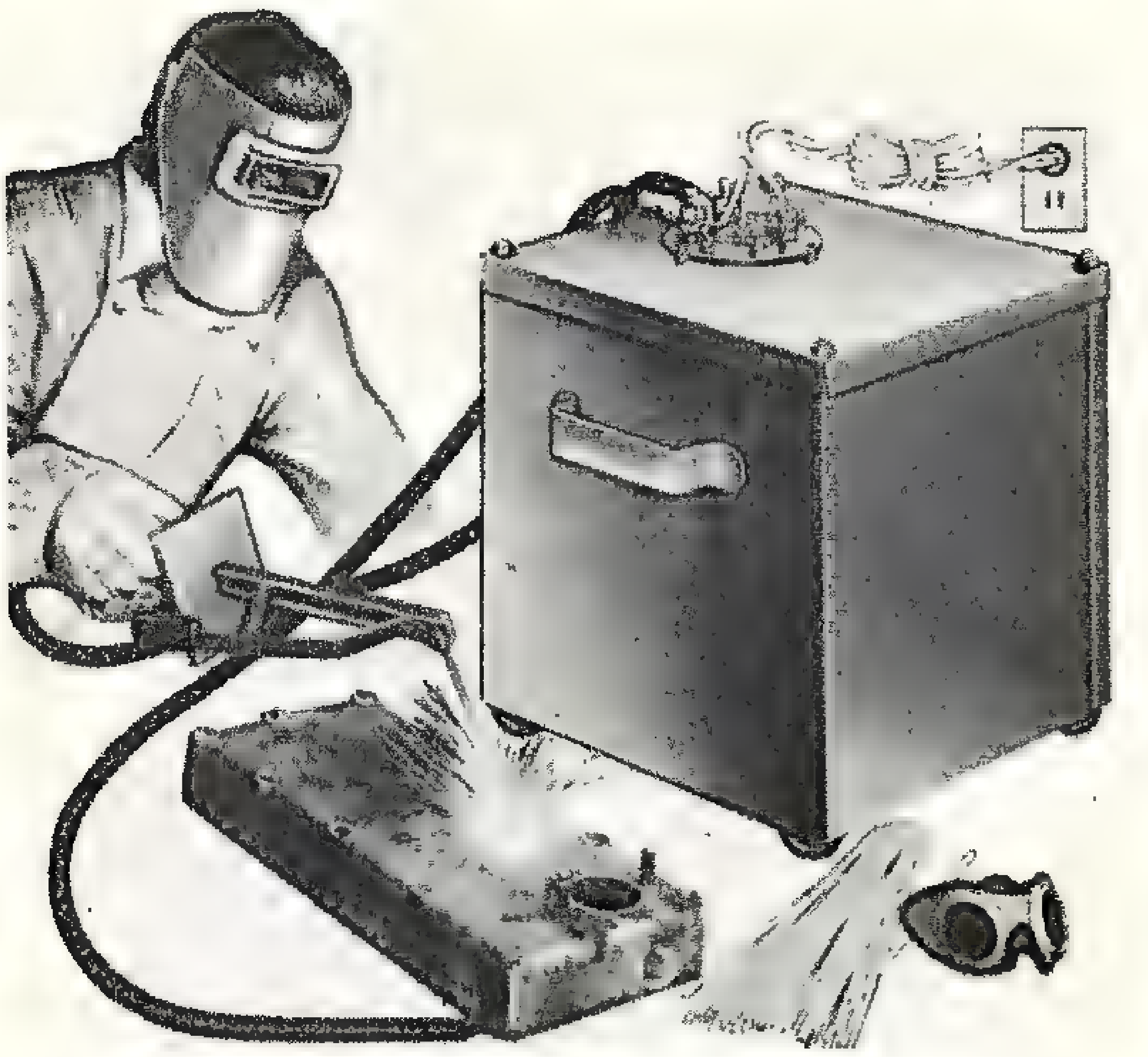
The huge spectrograph cases for the cameras were made possible by a new metal one-third lighter than aluminum, known as Dowmetal. There will be seven spectrographs to cover the full spectrum from infrared to ultra-violet.

Further information concerning the halo which surrounds the sun during an eclipse is also expected to be uncovered.



This giant machine is a movie camera using film 30 inches wide. It will be used by the Harvard-Massachusetts Tech expedition to Siberia to photograph the eclipse of the sun.

Small Arc Welder Handles Big Jobs



This portable arc welder, weighing but 150 pounds, can handle any welding job when plugged into a light socket. It is low in price, and operates at from 5 to 9 cents per hour.

A NEW arc welder operating from any ordinary light socket employs an entirely new construction principle which permits it to handle all arc welding jobs at an operating cost of but from 5 to 9 cents an hour. It has a maximum output of 80 amperes at 40 volts and is priced economically.

Amphibian Sets Two Altitude Marks

SOARING to an altitude of 27,950 feet, the Sikorsky S-43 amphibian plane shattered two world's altitude records for laden and unladen ships of this type in a recent test flight over Stamford, Conn.

The plane on its record breaking flight was piloted by Boris Sergievsky, and carried as passengers Igor Sikorsky, its designer, and Michael Pravikoff, mechanic. In addition the ship carried a 500-kilogram pay load.

In the substratosphere, where the temperature reached 40 degrees below zero, oxygen tubes were used. The S-43 is designed to carry 15 passengers, and is powered with two Hornet engines.

Sikorsky's 15-passenger amphibian, the S-43, is shown here on the flight in which she climbed 27,950 feet, to break two world's records for laden and unladen ships of this type.

FOUND—*King Solomon's*

THE SECRET OF WAR-TORN

Count Byron de Prorok (above), Europe's Roy Chapman Andrews, who found the lost gold mines of mighty King Solomon.

COUNT BYRON DE PROROK, famous explorer, is again back in the United States after a series of adventures that would make an Arabian Nights fable seem weak and colorless in comparison. He was successful in locating the exact spot where the legendary King Solomon of Biblical fame once mined fabulous tons of gold.

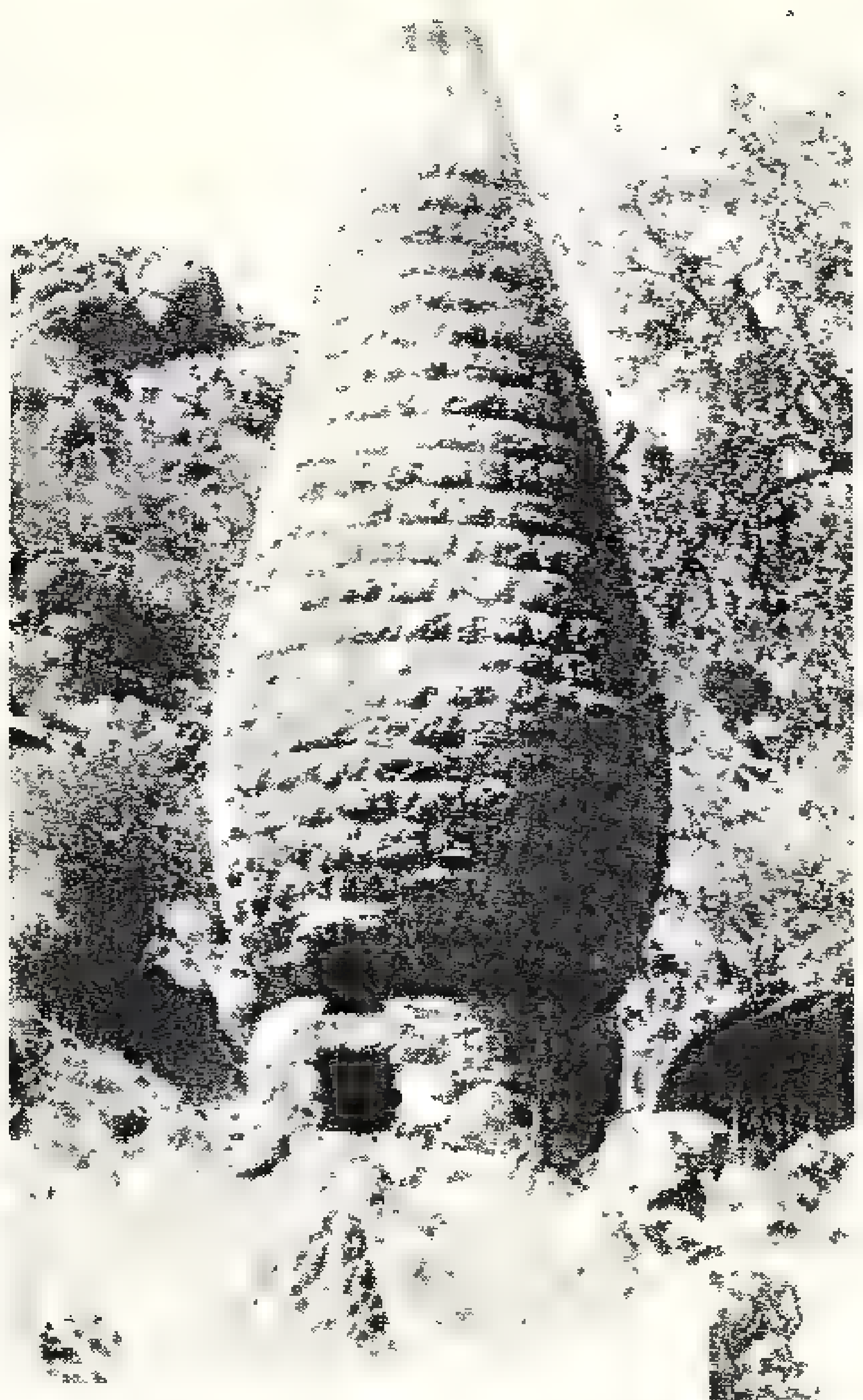
More important, and perhaps the reason for the Italian hosts pushing their way into Ethiopia, these ancient mines are being worked today on a scale that staggers the imagination. From a volcanic mountain top, de Prorok beheld countless slaves, both men and women, toiling night and day to uncover the heavy golden nuggets.

But let this distinguished archaeologist tell his own almost unbelievable story:

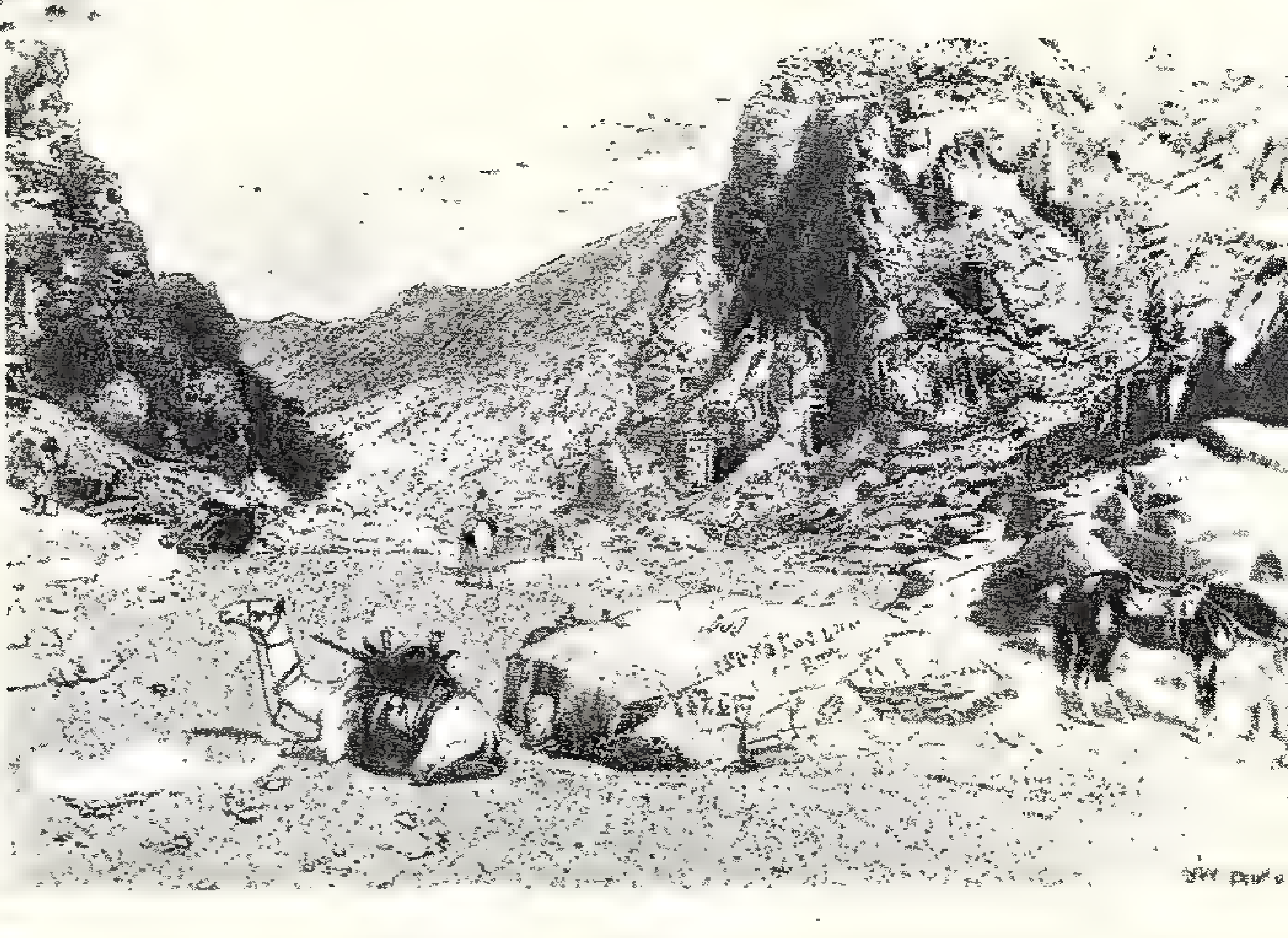
In the course of my numerous explorations in the interests of archaeology, I have found many ancient tombs and lost cities in Africa. Now I hoped to fulfill one of the major objectives of my career, the discovery of the original mines which supplied the fabulously wealthy monarchs of ancient times: Tut, Hannibal, Cleopatra, Alexander the Great, Solomon and the Queen of Sheba, with the vast supply of golden ornaments which made them famous.

For more than 15 years I have crisscrossed Africa's ancient caravan trails between Carthage and Utica, and from the Atlas to the Blue Nile in search of the origin of this lost gold. But without success. However, I had

Below—One of the untold thousands of dusky slaves who wash raw nuggets from the gold-ladened subterranean streams which flow under the almost extinct volcano.



One of the many tombs (above) of the long-dead consorts to Kings. Right—An actual sketch made by De Prorok showing the mines as they are today.



Gold MINES

ETHIOPIA *by* JAMES NEVIN MILLER

Deep in a smoldering volcano, dusky slaves still toil in the fabulously rich mines of Biblical days. Are they the reason behind Italy's Ethiopian war campaign?

located many valuable clues, some of them passed down from generation to generation, others mere whispers gleaned from adventurers who had been foolhardy enough to penetrate into these mysterious interiors and later lose their lives.

These clues convinced me that all trails led into the "back door" of Ethiopia, a remote western desert region ruled over by Solomon Ghogoli, a sultan who admits the supremacy of only one other ruler, Haile Selassie.

But an unforeseen difficulty presented itself: In order to penetrate the land of mystery we positively must have Haile Selassie's official permission, and in writing. Otherwise we would be certain victims of Sultan Ghogoli's murderous warriors.

This was just before the Italo-Ethiopian war began. But even then Selassie must have foreseen the conflict because he was at that time so much occupied with military affairs that we found it next to impossible to see him. But finally, after endless formalities and diplomatic action, the Emperor gave us the first permission ever given to white men to explore the forbidden land of the Blue Nile.

After receiving the first official permit to cross the closed area of the British Sudan we reached Kumuk from Kaston by following the jungle-enclosed banks of the Blue Nile to where Selassie had promised us a military escort of 120. But at the desolate barrier we waited in vain.

Their forefathers slaves to Cleopatra, today's Abyssinian "customs" men are really brigands. And Count de Prorok (mounted) is having border trouble, with his interpreter in loud and heated debate.

Through Country Forbidden to Hated White Men

De Prorok's party (left) have just been captured by Ghogoli's emissaries when the Count's cameramen took this shot, another of the exclusive pictures you see here. De Prorok is second from the extreme left, the man with the beard. When mad savages scrutinize you in this fashion, it is a question of keeping your head or losing it.

When the seasoned adventurer goes on safari, physical comforts are discarded, as shown by De Prorok's tent and personal necessities. But even these were dropped at the mines so that the porters could trek back with museum pieces.

Right here we made the mistake that almost cost us our lives. We decided to penetrate the interior in the hopes of meeting the escort there. This would have been a wise procedure if we had been properly supplied with official passports from the Emperor. Unfortunately the soldiers who were to bring them failed to show up, and we were so impatient to be on the move that we proceeded anyway.

So we headed straight for the Old Man of the Mountain, dread Solomon Ghogoli, Sultan of the Shangul. He was over 100 years old, maintained many wives and was, it was rumored, the owner of secret gold mines which no white man had ever seen. Never was he known to permit a European or American to visit his vast, savage realm.

For three terrible days we trekked across the enormous canyons and great mountains of this legendary land. Even in the shade our thermometers registered from 140 to 160 degrees Fahrenheit, so much greater than the heat of the human body that we were actually able to cool our hands by clamping them under our armpits. The merciless heat once reached 167 degrees, three-fourths as hot as boiling water.

Our porters were terror-stricken. They were fearful of being caught and killed by the savage sultan. No wonder many of them deserted.

On the fourth day we made a fantastic discovery. While daytime camping in a jungle with my companions I suggested we climb a great mountain about two miles from our camp. We did so and found its approximate center was the huge crater of a smoldering volcano. Aided by powerful binoculars from the heights on the far side we saw, a thousand feet below, a weird sight: untold thousands of black slaves, both men and women, working feverishly in the subterranean river bed.

This picture shows Sultan Ghogoli's warriors taking the Count into camp with the intention of holding him for ransom, making him a slave, or murdering him and salvaging his head.

Smoking Volcano Hides King Solomon's Mines

Amazed, I asked our guide, Diressa, "What on earth are they doing?"

He warned "Come away, master! They are Ghogoli's slaves, washing out gold." The sight excited us, and soon we tumbled and slid down there. For the skeptical minded, let me add that our movie cameras took in the entire astounding spectacle. Some of those nuggets were as big as a man's fist.

While the cameras were grinding away, my fellow scientists and I explored the rocks of the nearest canyons and found ancient hieroglyphics and rock drawings on the entrances of many of the abandoned mine shafts.

Our excitement knew no bounds. By purest chance we had achieved the major objective of our expedition. Think of it! We had found the precise spot where King Solomon of Biblical fame mined the gold that provided his court with unparalleled luxuries! Was there much gold here? There must have been untold tons of it, and the precious metal was being panned in the same crude way as practiced in Bible times.

Yes, these mounds and the rock markings told us the story students of archaeology had been seeking in vain to find ever since the mines were lost.

We were highly successful in bribing the guards with the aid of Ethiopian money, to permit us to look at some of the tombs. Which may sound strange—our "buying them" in this fashion, since they were handling such vast quantities of raw gold. But if a guard was caught with virgin gold in his possession he was executed or mutilated. But any actual money was not disturbed.

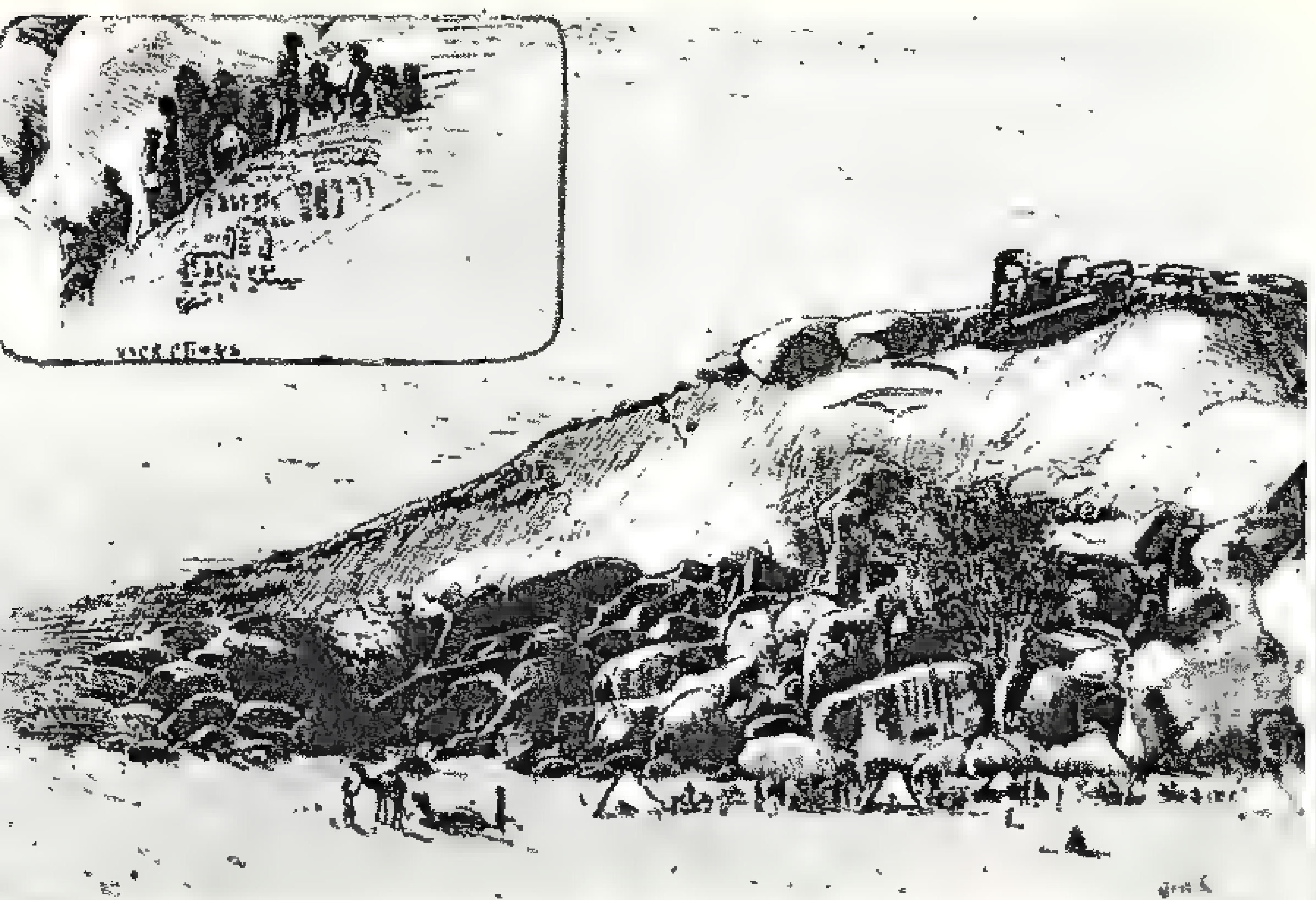
Then we heard the booming of giant tom-toms telegraphing messages to Ghogoli in his stronghold 50 miles away. His sacred territory was being invaded by members of the races he despised more than anything else in the world. And here in the mines danger lurked everywhere. The blazing heat was all but unbearable and the guards looked murderous.

Nevertheless, we started digging into the tombs and worked all that night and through the next day. But at dusk the tom-toms began to boom again. Time was short. We knew we must act with the greatest speed, and instantly.

Hastily we packed up our specimens and started on a race for the Yabus River and safety, and three days later, utterly exhausted, we reached Albi Moti, the nearest Ethiopian village, praying that the promised military escort was there awaiting us with our official passports. But it was not.

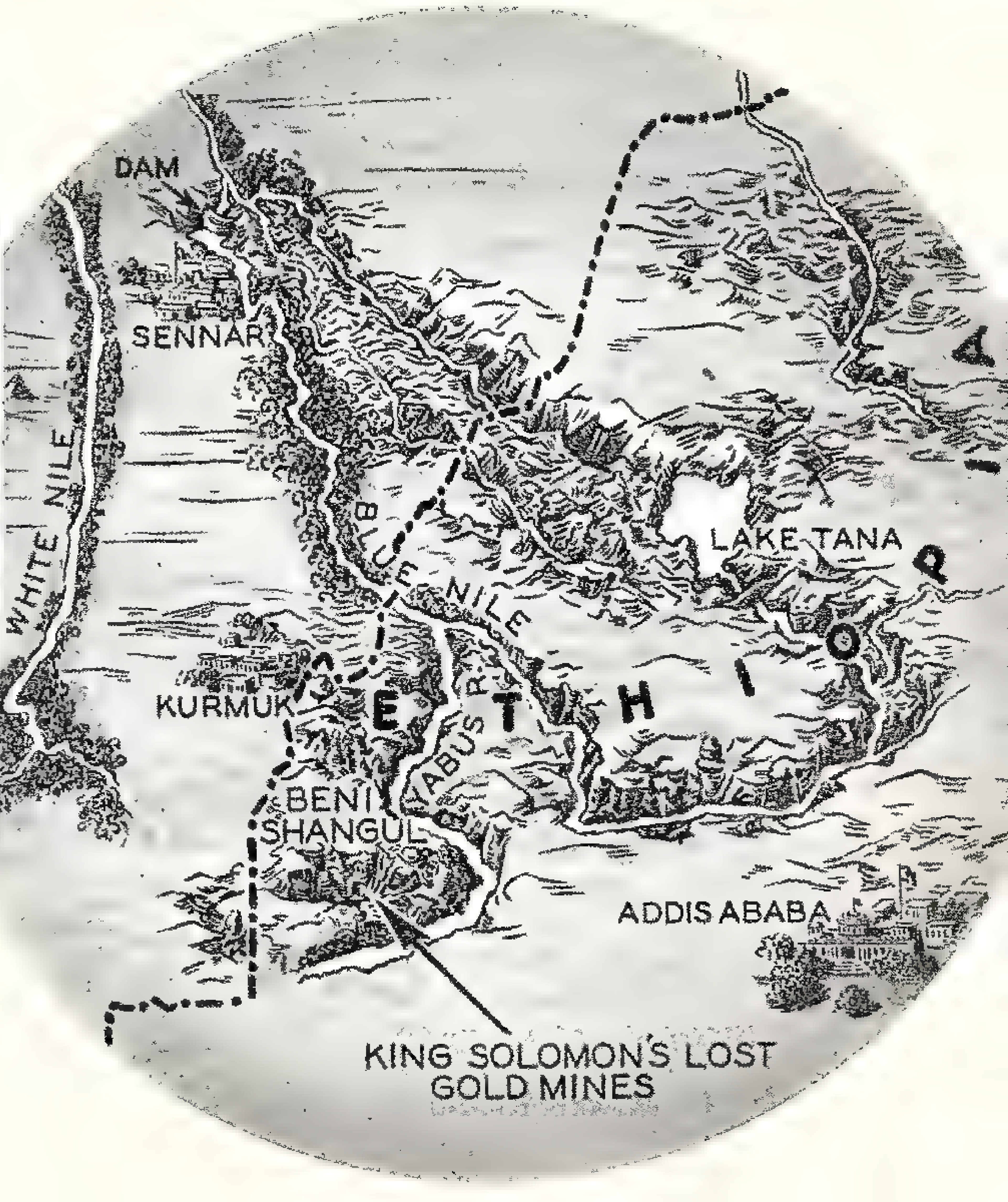
We camped on a hill near the village, and as if by magic suddenly found ourselves

[*Continued on page* 141]



Photographs of King Solomon's mines are today aiding the drafting of another exploration trip into this same territory, and so cannot be released to public gaze, but here are De Prorok's authentic drawings of the mines.

The map at the right shows the probable location of King Solomon's mines. But if you intend going there, banish the thought. For when you are camped out there on the veldt and the tom-toms beat, all the gold in the world wouldn't buy your chance for life.



Giant Diamond Cut To Make $2,000,000 Necklace

Lazare Kaplan is pictured here with Jonker diamond which he successfully cut. Originally weighing 726 carats, the huge stone will be used in making a necklace valued at $2,000,000.

THE 726-carat Jonker diamond which recently was the world's largest and finest uncut diamond is now in three pieces. Later these three pieces will be split into twelve pieces, most of which the owner hopes to see sold in a $2,000,000 necklace. It was Jacobus Jonker who found the diamond in a South African field.

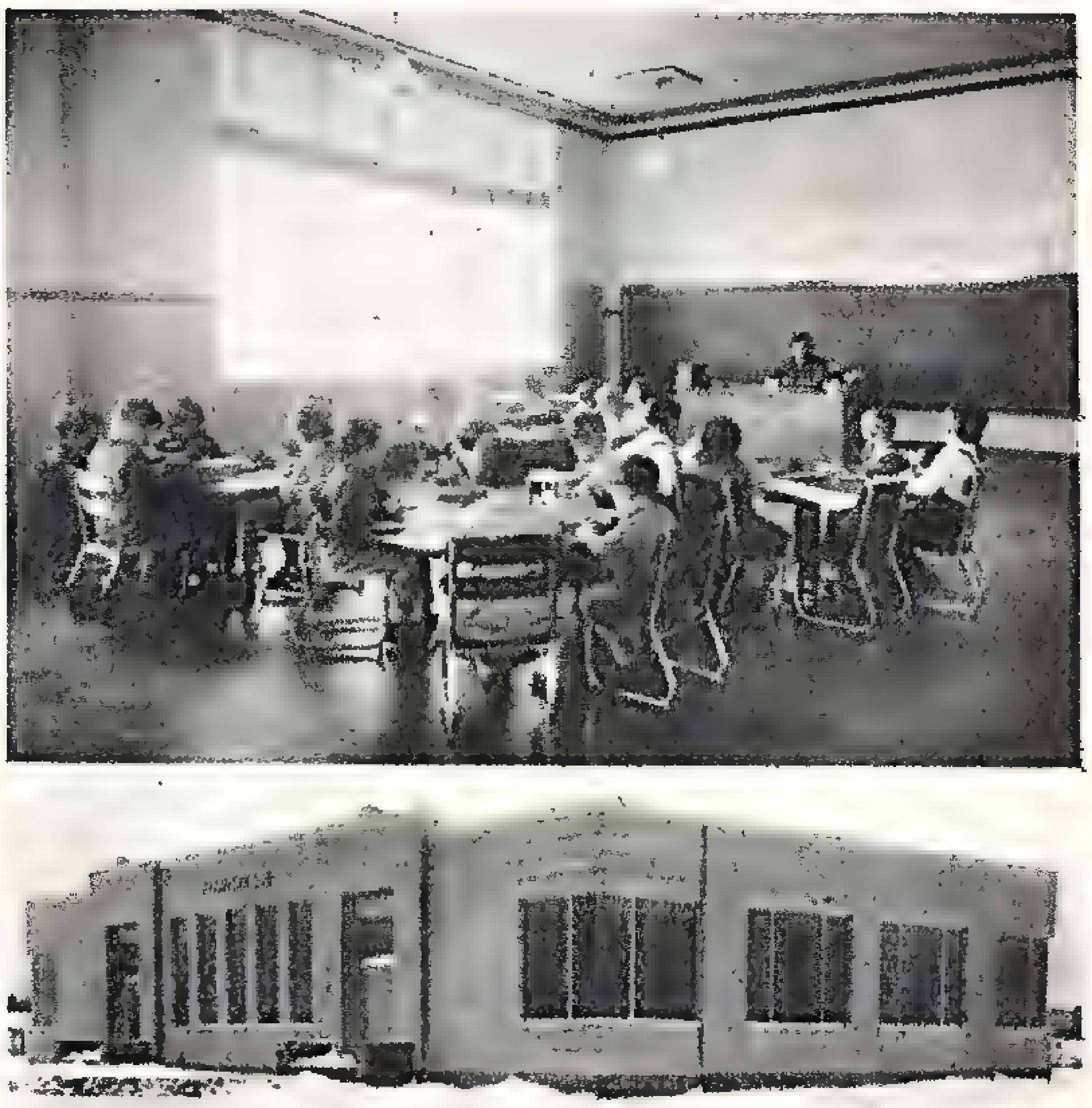
Lazare Kaplan, who cut the diamond, is still smiling over the success of his biggest job. He tapped a wedge against the uncut stone with a brass hammer and severed it—an operation so delicate that even the present owner, Harry Winston, wouldn't look on. There was a silent moment in the workshop in which everyone sat tense, then a few taps of the hammer and Kaplan exclaimed, "I did it!"

"Whippets" Guard Europe's Seas

TINY torpedo craft capable of speeds of 40 knots while carrying a full load of torpedos are being constructed for several of the European powers by a British boat building firm. The boats, which are not much larger than a pleasure cruiser are capable of defending themselves against destroyers. Having a cruising range of 800 miles and being of minute size they can enter enemy territory without being spotted. The boats are 55 feet long and are powered by 900 h. p. motors.

Capable of giving chase to full size destroyers this "Whippet" torpedo boat measures only 55 feet in length. Fully loaded it has maximum speed of 40 knots; cruising range of 800 miles.

Modern School Built Of Glass Bricks

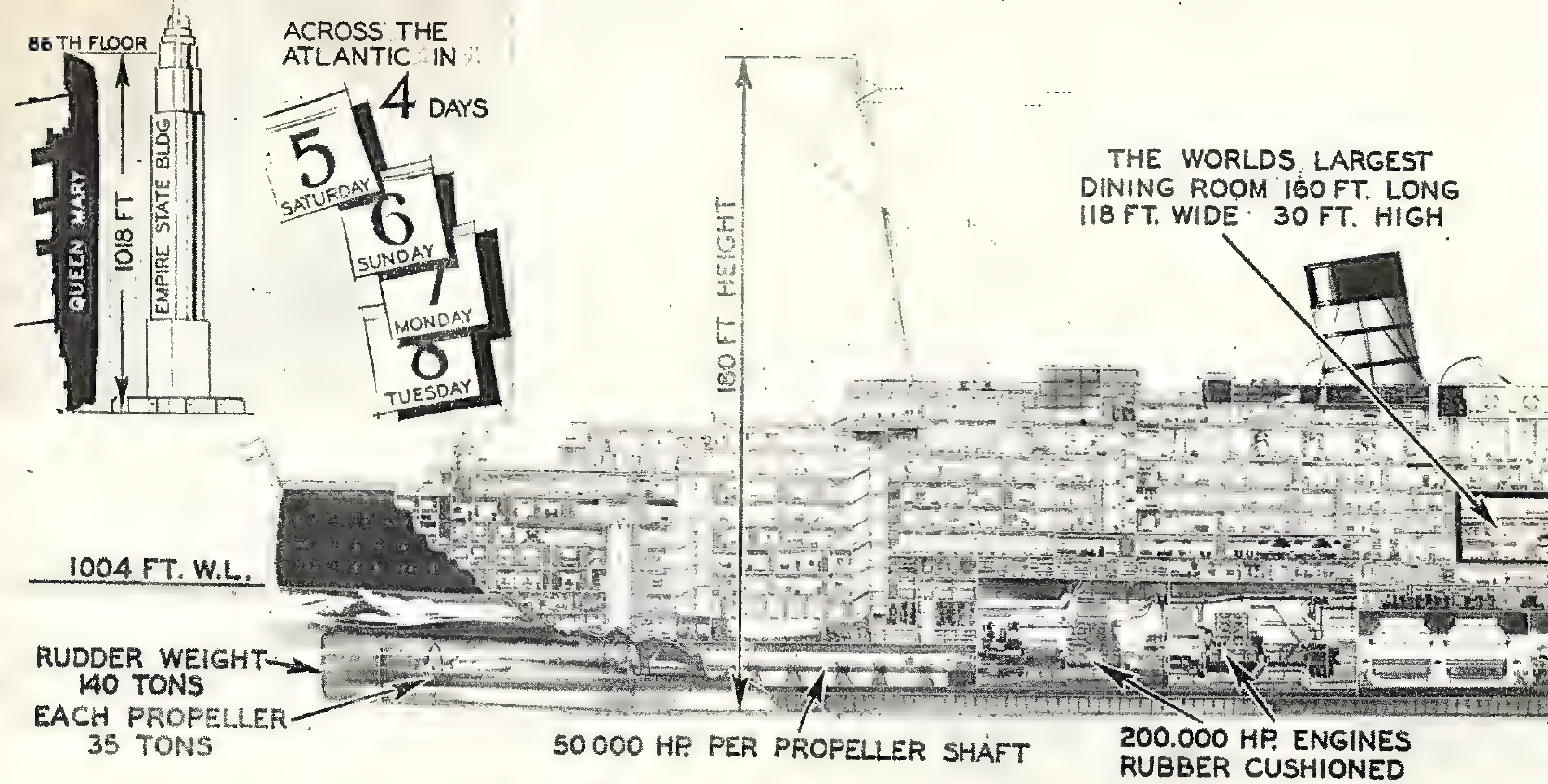


Employing electric eyes to operate classroom lights and glass bricks instead of windows this grammar school at Hibbing, Minn., is claimed one of the most modern educational centers.

EDUCATION as well as industry is in the stage of modernization with the little red school house becoming a thing of the past. Featuring all-glass construction and furnished in the most modern taste, Park School in Hibbing, Minn., is perhaps the most up-to-date grammar school in the entire country. Where light was not desired regular bricks were used. Electric lights in the classrooms are controlled by an electric eye which automatically turns them on when the sun is not shining. Desks can be moved where desired.

The Queen Mary
COMES TO AMERICA

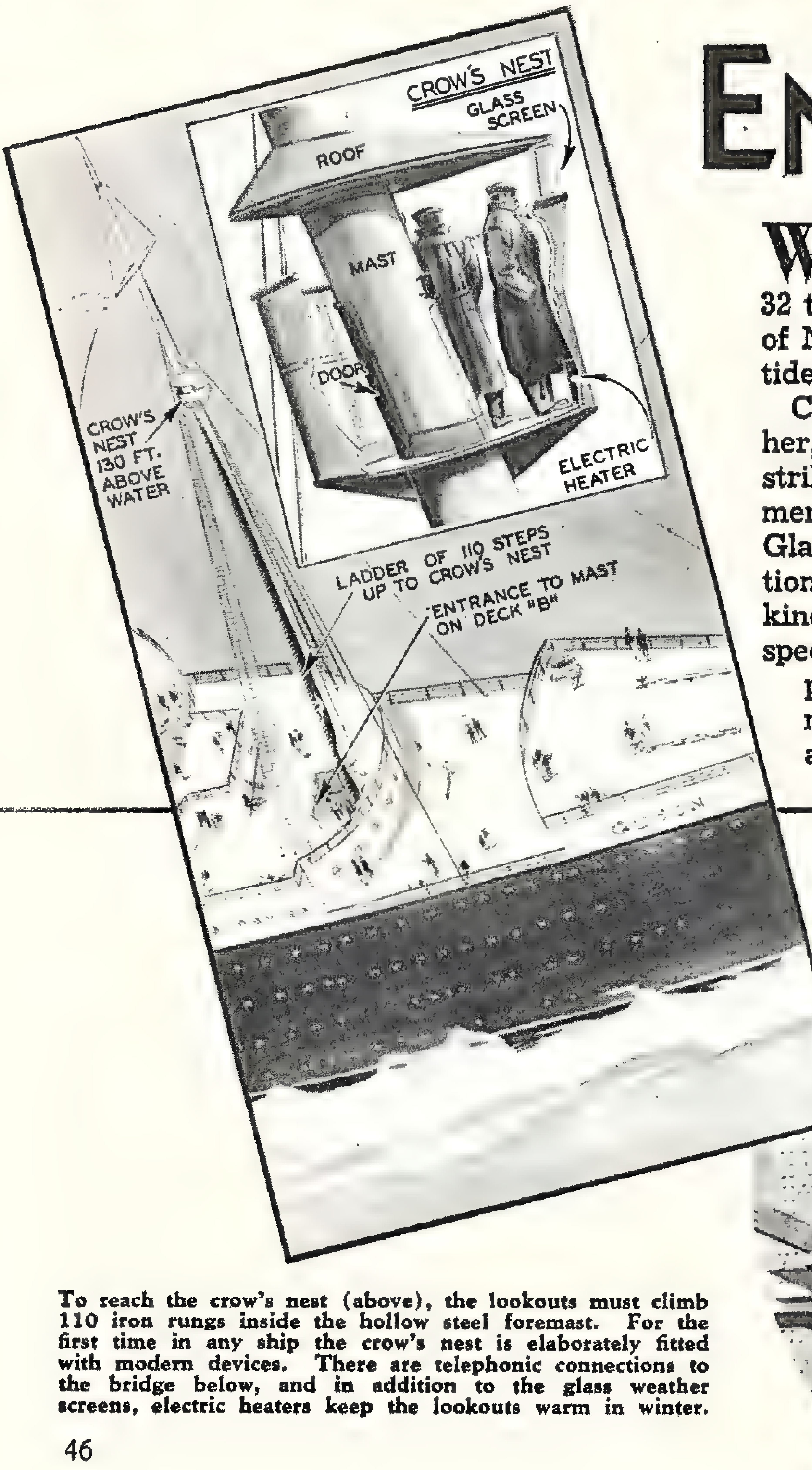
To the accompaniment of tooting whistles and the cheers of thousands of spectators, the *Queen Mary* started on her test trip. The complete story of this amazing liner starts on page 46


86TH FLOOR
QUEEN MARY
1018 FT
EMPIRE STATE BLDG
ACROSS THE ATLANTIC IN 4 DAYS
5 SATURDAY
6 SUNDAY
7 MONDAY
8 TUESDAY
180 FT. HEIGHT
THE WORLDS LARGEST DINING ROOM 160 FT. LONG 118 FT. WIDE 30 FT. HIGH
1004 FT. W.L.
RUDDER WEIGHT 140 TONS
EACH PROPELLER 35 TONS
50 000 HP. PER PROPELLER SHAFT
200.000 HP. ENGINES RUBBER CUSHIONED

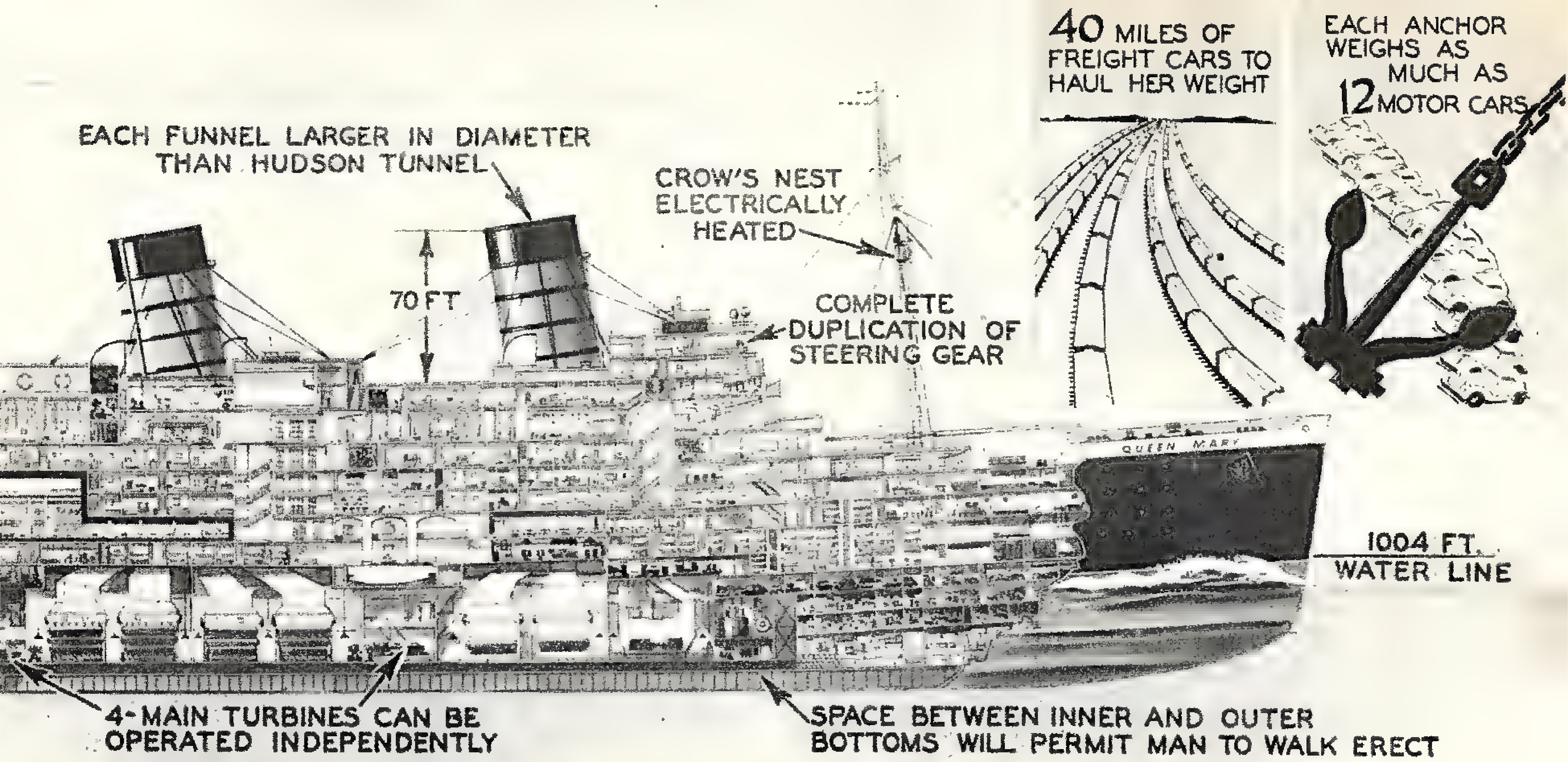
ENGLAND'S

WHEN England's giant liner, the *Queen Mary* drops her anchors at quarantine, 32 tons of steel will grapple the mud bottom of New York Bay and swing her against the tide on 145 tons of massive steel chain.

Captain Sir Edgar Britton, commanding her, says she is a "good sound job." But what strikes one most is the loveliness of her immense presence. For she is a great lady, Glasgow born and bred to follow the traditions of her ancestry—safety, comfort, sea-kindliness, regular arrival and departure, and speed. As speed queen hostess to 3,500 persons, passengers and crew, she has the most powerful engines afloat, cushioned as in an automobile, with the engine room


CROW'S NEST
GLASS SCREEN
ROOF
MAST
DOOR
ELECTRIC HEATER
CROW'S NEST 130 FT. ABOVE WATER
LADDER OF 110 STEPS UP TO CROW'S NEST
ENTRANCE TO MAST ON DECK "B"

To reach the crow's nest (above), the lookouts must climb 110 iron rungs inside the hollow steel foremast. For the first time in any ship the crow's nest is elaborately fitted with modern devices. There are telephonic connections to the bridge below, and in addition to the glass weather screens, electric heaters keep the lookouts warm in winter.


40 MILES OF FREIGHT CARS TO HAUL HER WEIGHT
EACH ANCHOR WEIGHS AS MUCH AS 12 MOTOR CARS
EACH FUNNEL LARGER IN DIAMETER THAN HUDSON TUNNEL
CROW'S NEST ELECTRICALLY HEATED
70 FT
COMPLETE DUPLICATION OF STEERING GEAR
QUEEN MARY
1004 FT.
WATER LINE
4-MAIN TURBINES CAN BE OPERATED INDEPENDENTLY
SPACE BETWEEN INNER AND OUTER BOTTOMS WILL PERMIT MAN TO WALK ERECT

WONDER GIANT

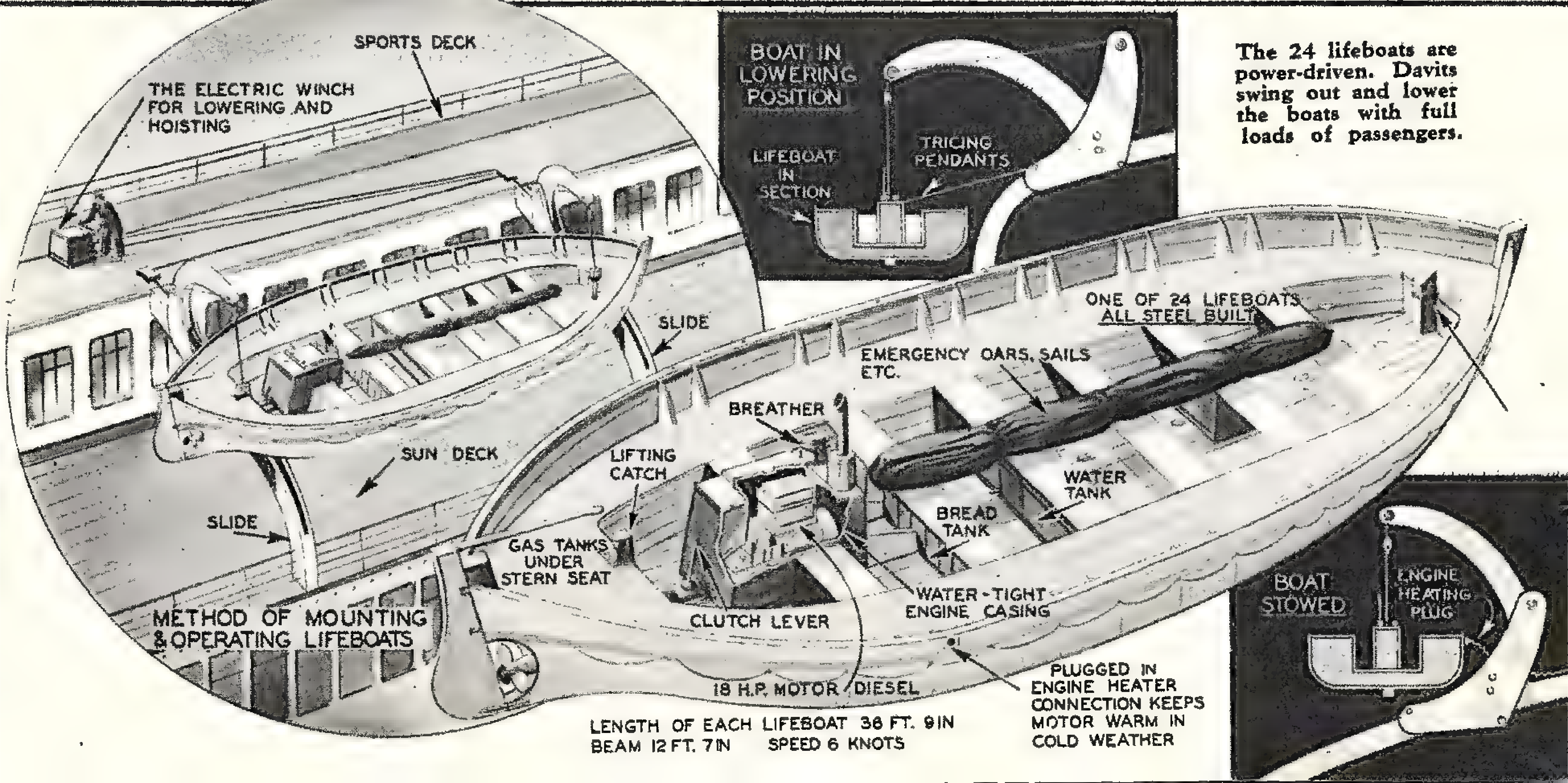
PUTS TO SEA

"sprung" to eliminate the least vibration. Her single reduction geared turbines develop 200,000 horsepower and operate four 35-ton propellers. She is 1,018 feet long, 118 feet wide, 135 feet high from her keel to the top of her superstructure, and she displaces 83,000 tons of sea water.

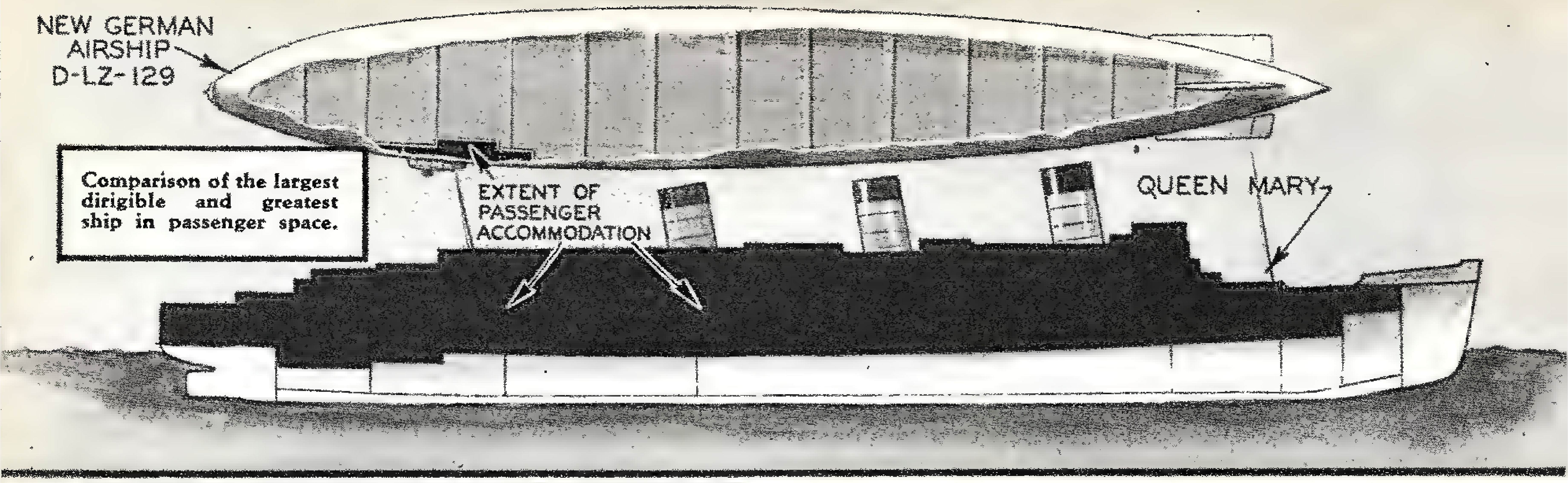
Should her double hull, in which a man can walk erect, be punctured, any one or all of 37 watertight bulkheads would close. Her 24 all-steel unsinkable lifeboats carry 145 passengers each. There are 30,000 electric lights to give her illumination, 50 miles of plumbing, 21 elevators, special garages, a shopping center, gymnasium, cafes, lounges and even a kennel deck for dogs.

Strength, sea-kindliness and ease of movement through rough water are built into *Queen Mary's* knife-edge bow and all underwater "streamlining," to keep her steady on the rough North Atlantic and stifle the pounding of the tremendous following seas of the eastern passage.

And if you tune in Singing Sam's deep bass final note of "Asleep In The Deep," you will have an excellent idea of how the ship's sirens sound. The deep, soft, far-carrying

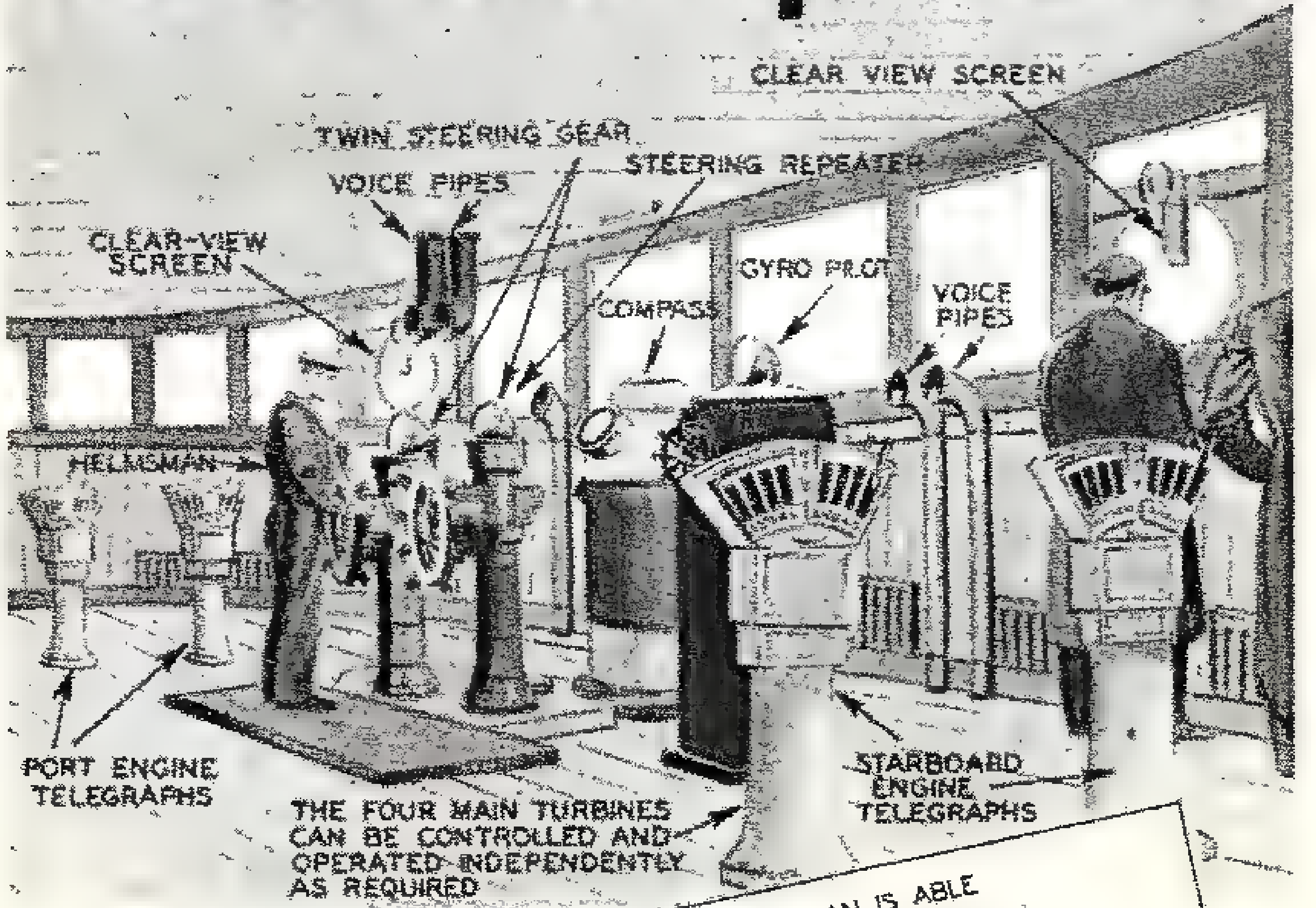

SPORTS DECK
THE ELECTRIC WINCH FOR LOWERING AND HOISTING
BOAT IN LOWERING POSITION
LIFEBOAT IN SECTION
TRICING PENDANTS
SLIDE
ONE OF 24 LIFEBOATS ALL STEEL BUILT
EMERGENCY OARS, SAILS ETC.
BREATHER
SUN DECK
LIFTING CATCH
WATER TANK
BREAD TANK
SLIDE
GAS TANKS UNDER STERN SEAT
METHOD OF MOUNTING & OPERATING LIFEBOATS
CLUTCH LEVER
WATER-TIGHT ENGINE CASING
BOAT STOWED
ENGINE HEATING PLUG
18 H.P. MOTOR DIESEL
PLUGGED IN ENGINE HEATER CONNECTION KEEPS MOTOR WARM IN COLD WEATHER
LENGTH OF EACH LIFEBOAT 36 FT. 9 IN
BEAM 12 FT. 7 IN SPEED 6 KNOTS

The 24 lifeboats are power-driven. Davits swing out and lower the boats with full loads of passengers.


NEW GERMAN AIRSHIP D-LZ-129
EXTENT OF PASSENGER ACCOMMODATION
QUEEN MARY

Comparison of the largest dirigible and greatest ship in passenger space.

Great Ship Is ROBOTS' Paradise


CLEAR VIEW SCREEN
TWIN STEERING GEAR
VOICE PIPES
STEERING REPEATER
CLEAR-VIEW SCREEN
GYRO PILOT
VOICE PIPES
COMPASS
HELMSMAN
PORT ENGINE TELEGRAPHS
THE FOUR MAIN TURBINES CAN BE CONTROLLED AND OPERATED INDEPENDENTLY AS REQUIRED
STARBOARD ENGINE TELEGRAPHS

tone can be clearly heard for ten miles, yet its mellow "A" depth will not disturb the passengers.

The great restaurant on "C-Deck" accommodates 815 diners and is the largest room of its kind ever built into a ship. It is 160 feet long, runs the full width of the beam, and towers up through three decks. In the vast adjoining kitchens, among other labor-saving devices, is Robot Molly, the mechanical dishwasher. She can wash, rinse, polish and sterilize thousands of dishes an hour, but never break even the most fragile china cup. And there are 200,000 pieces of china and 100,000 items of tableware to keep clean.

Diners in this restaurant can look up at a painting of the North Atlantic and see a miniature Queen Mary duplicating the course of the mother ship. Thus the exact latitude

[*Continued on page 144*]

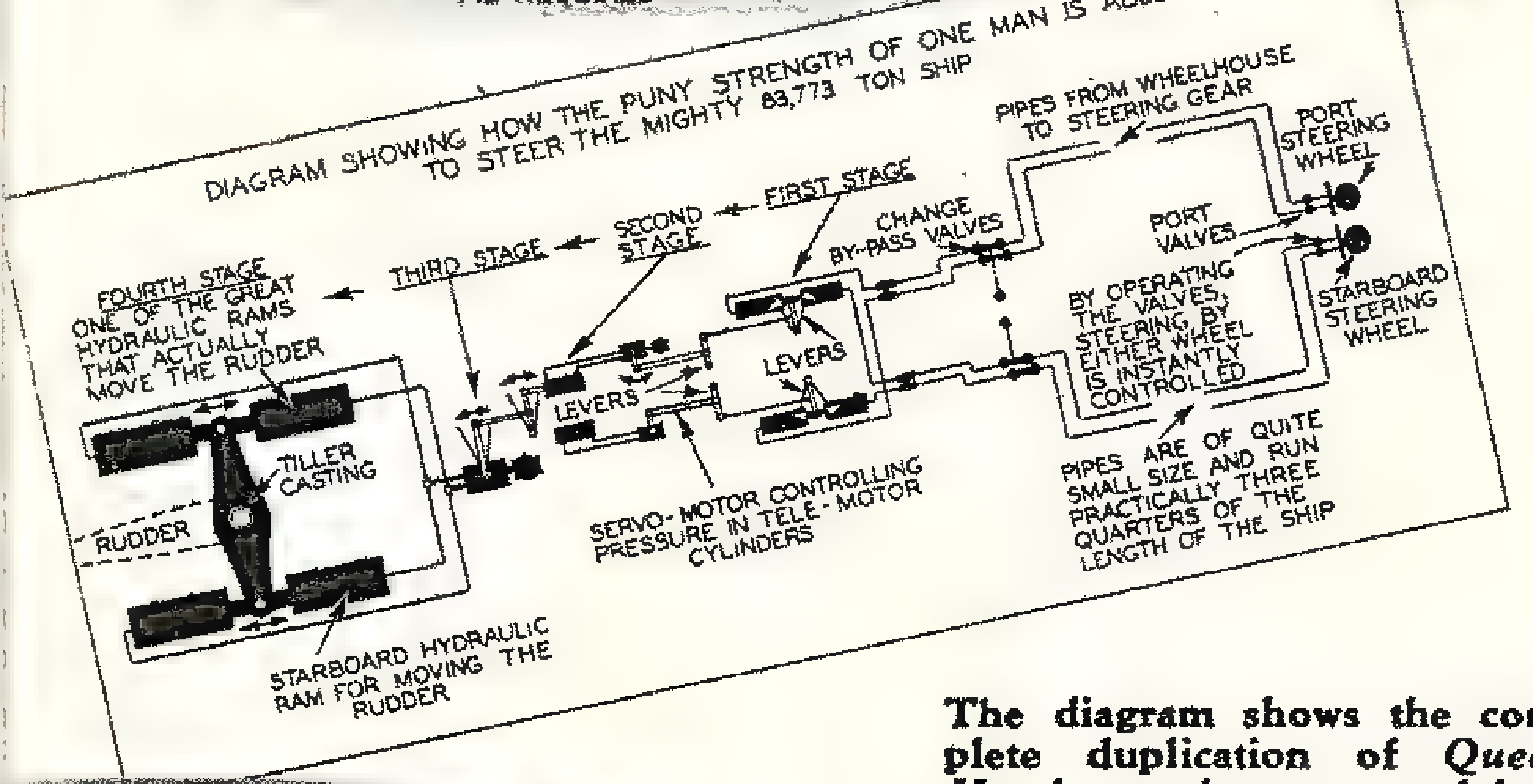
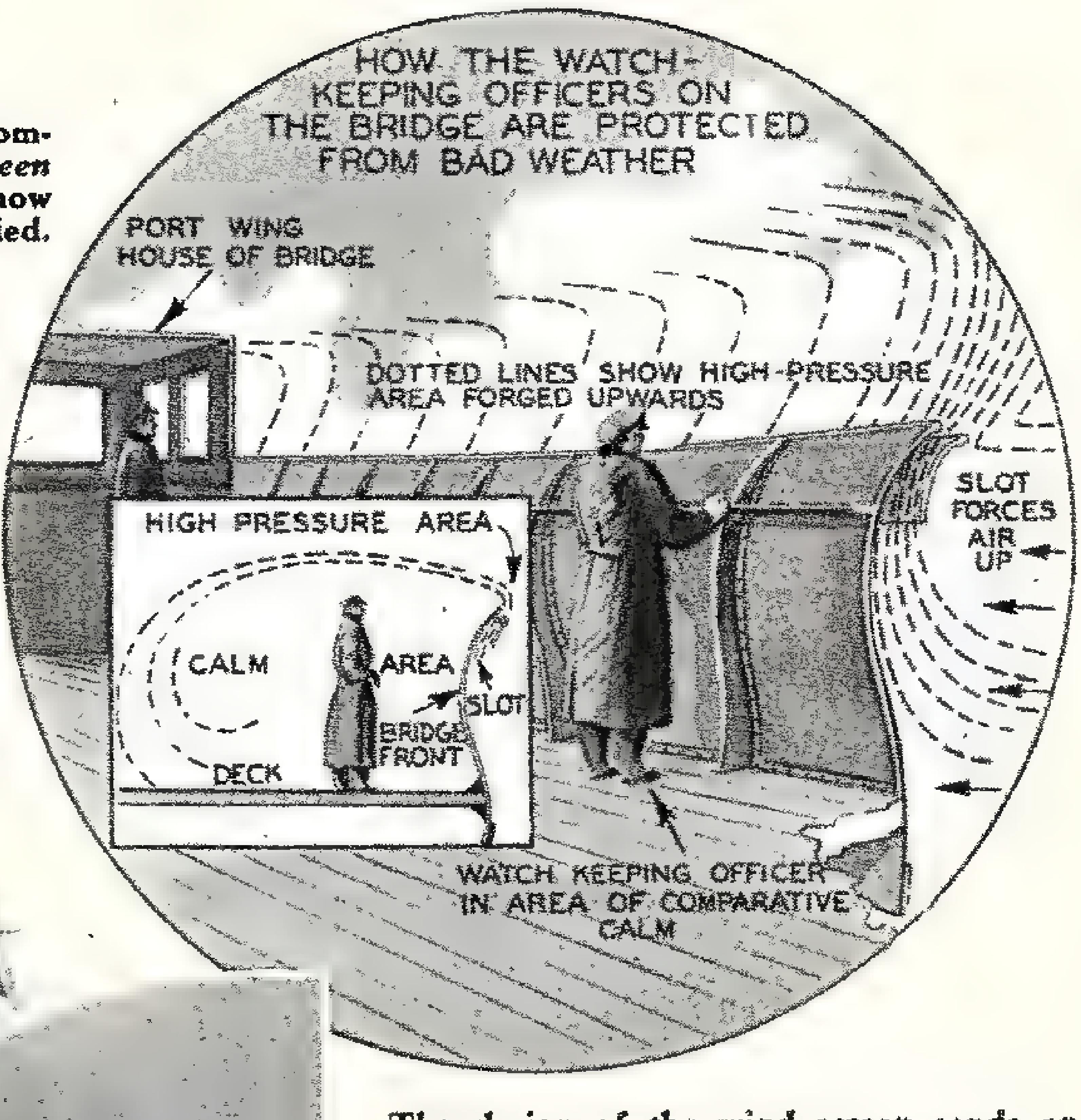
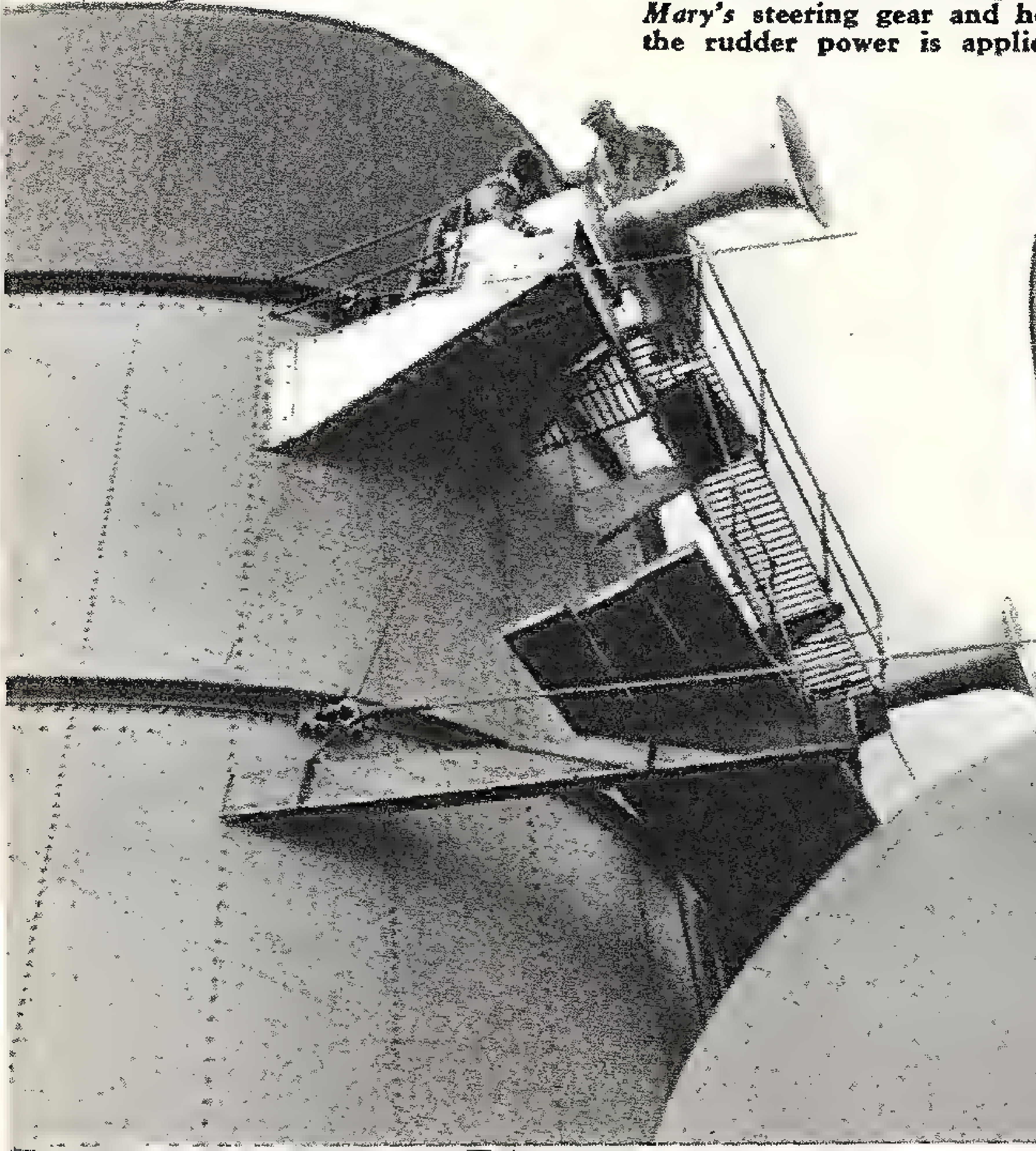


DIAGRAM SHOWING HOW THE PUNY STRENGTH OF ONE MAN IS ABLE TO STEER THE MIGHTY 83,773 TON SHIP
PIPES FROM WHEELHOUSE TO STEERING GEAR
PORT STEERING WHEEL
FIRST STAGE
SECOND STAGE
THIRD STAGE
FOURTH STAGE ONE OF THE GREAT HYDRAULIC RAMS THAT ACTUALLY MOVE THE RUDDER
CHANGE BY-PASS VALVES
PORT VALVES
BY OPERATING THE VALVES, STEERING BY EITHER WHEEL IS INSTANTLY CONTROLLED
STARBOARD STEERING WHEEL
LEVERS
LEVERS
TILLER CASTING
RUDDER
SERVO-MOTOR CONTROLLING PRESSURE IN TELE-MOTOR CYLINDERS
PIPES ARE OF QUITE SMALL SIZE AND RUN PRACTICALLY THREE QUARTERS OF THE LENGTH OF THE SHIP
STARBOARD HYDRAULIC RAM FOR MOVING THE RUDDER

The diagram shows the complete duplication of *Queen Mary's* steering gear and how the rudder power is applied.

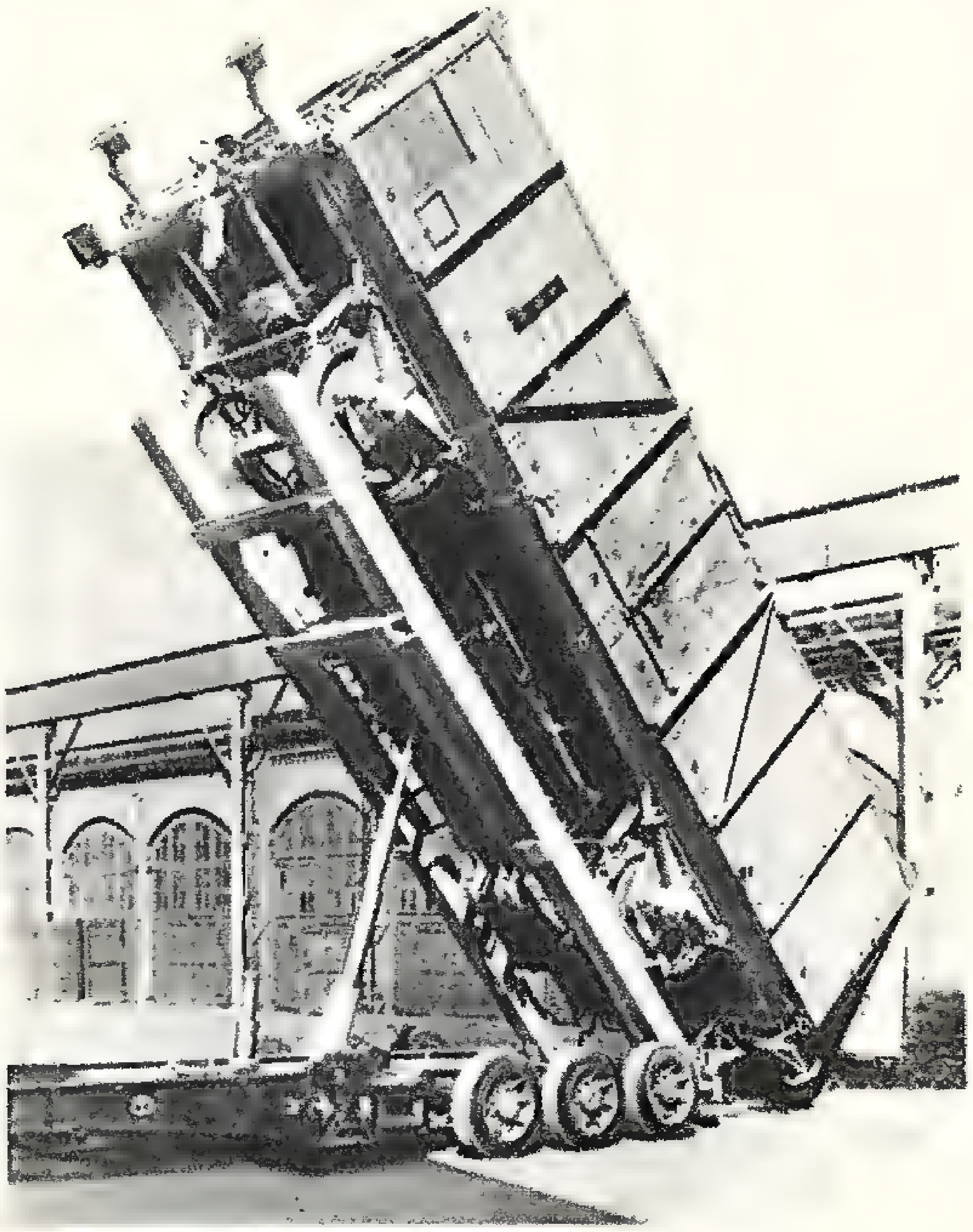

HOW THE WATCH-KEEPING OFFICERS ON THE BRIDGE ARE PROTECTED FROM BAD WEATHER
PORT WING HOUSE OF BRIDGE
DOTTED LINES SHOW HIGH-PRESSURE AREA FORCED UPWARDS
SLOT FORCES AIR UP
HIGH PRESSURE AREA
CALM
AREA
SLOT
BRIDGE FRONT
DECK
WATCH KEEPING OFFICER IN AREA OF COMPARATIVE CALM

The design of the wind screen sends an invisible tent of wind over bridge officers.



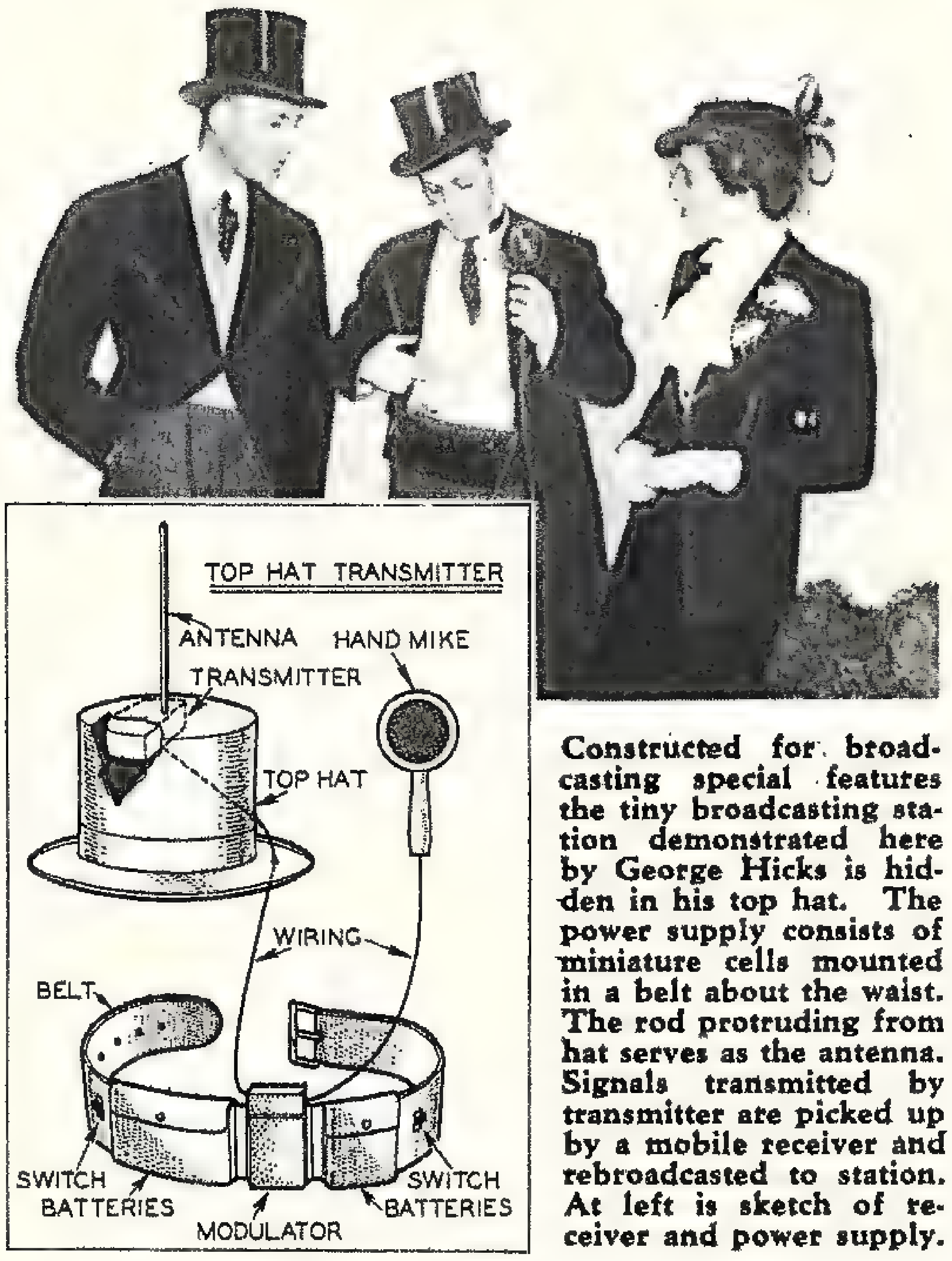
Motor Truck Picks Up Freight Car To Deliver Goods

IN ORDER that bulk rail shipments could be delivered to their destination without reloading the German railways have placed into service special semi-trailer trucks which can deliver a loaded freight car to the most remote locality. The trailer is provided with rails so that it may be backed to a siding where a switch engine pushes the car on board. The wheels of the car are then locked and the truck starts on its overland journey. Upon reaching the destination a hydraulic lift is brought into service and the car tilted so that the bulk contents, such as grain or coal, can be removed rapidly.



This specially designed trailer truck now in use by German railways delivers rail shipments to remote places where service is not available. A hydraulic lift tilts car for unloading.

Radio Station Built In Top Hat



Constructed for broadcasting special features the tiny broadcasting station demonstrated here by George Hicks is hidden in his top hat. The power supply consists of miniature cells mounted in a belt about the waist. The rod protruding from hat serves as the antenna. Signals transmitted by transmitter are picked up by a mobile receiver and rebroadcasted to station. At left is sketch of receiver and power supply.

DESIGNED for special broadcast purposes by O. B. Hanson, Chief Engineer for the National Broadcasting Company, a tiny microwave broadcasting station fits in the crown of the announcer's hat. Powered by a miniature power supply the transmitter has a broadcasting range of one-quarter mile. Its unusual construction permits announcers to mingle in a crowd without the use of a cable between the mobile apparatus and his microphone. Comments made by the announcer are picked up by a microwave receiver.

New Bus Features Aluminum Body

DESIGNED by a young Spokane, Washington manufacturer, a new aluminum bus may revolutionize the motor coach industry. The bus, of streamline design and powered by a V-8 Ford engine installed in the rear of the chassis, reduces the weight over similar coaches by two tons. The construction of the bus is such that loaded or empty one-third of its weight is at the front and two-thirds at the rear so as to insure maximum traction at all times.

Featuring a body constructed of aluminum instead of the usual steel, this modern bus reduces gross weight by two tons. A V-8 Ford motor is sufficient to power the new motor coach.

Hidden HAZARDS *of*

by TOM MURRAY

Circus performers are trained from infancy. These skilled high wire artists are still in their early teens.

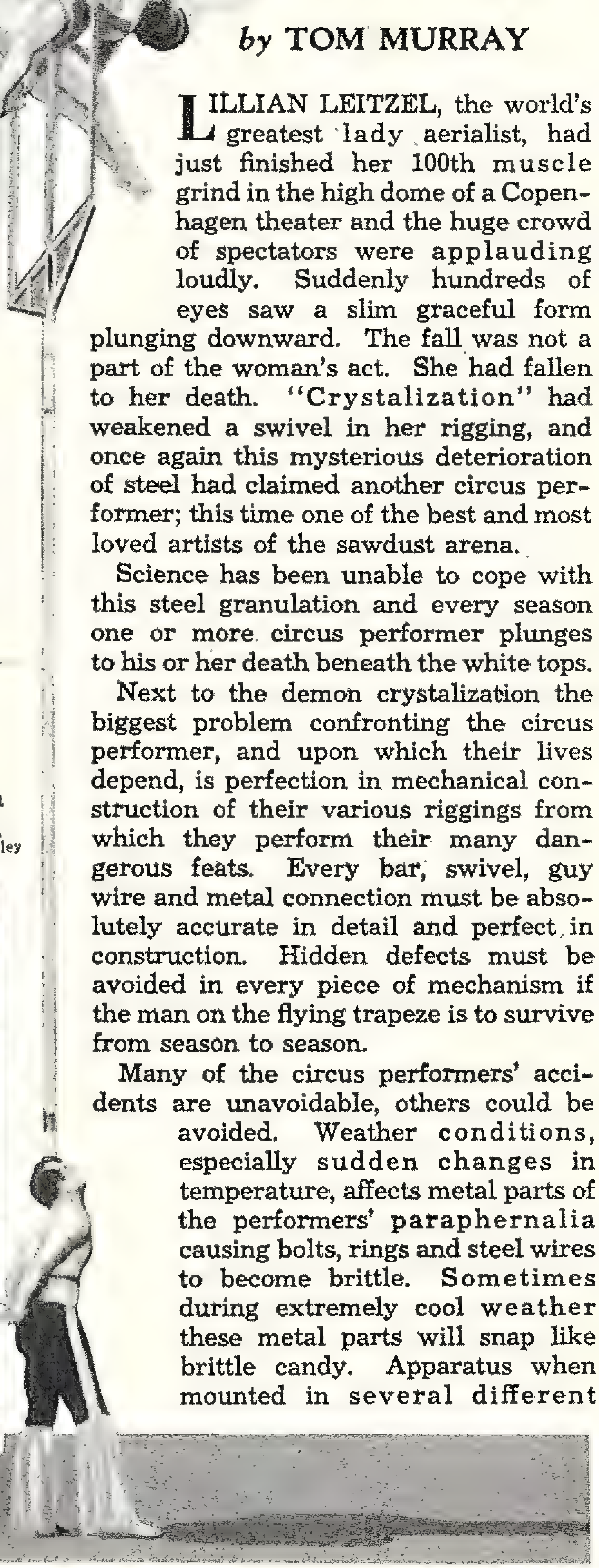
Photos at right copyright by Ringling Bros. Barnum & Bailey

LILLIAN LEITZEL, the world's greatest lady aerialist, had just finished her 100th muscle grind in the high dome of a Copenhagen theater and the huge crowd of spectators were applauding loudly. Suddenly hundreds of eyes saw a slim graceful form plunging downward. The fall was not a part of the woman's act. She had fallen to her death. "Crystalization" had weakened a swivel in her rigging, and once again this mysterious deterioration of steel had claimed another circus performer; this time one of the best and most loved artists of the sawdust arena.

Science has been unable to cope with this steel granulation and every season one or more circus performer plunges to his or her death beneath the white tops.

Next to the demon crystalization the biggest problem confronting the circus performer, and upon which their lives depend, is perfection in mechanical construction of their various riggings from which they perform their many dangerous feats. Every bar, swivel, guy wire and metal connection must be absolutely accurate in detail and perfect in construction. Hidden defects must be avoided in every piece of mechanism if the man on the flying trapeze is to survive from season to season.

Many of the circus performers' accidents are unavoidable, others could be avoided. Weather conditions, especially sudden changes in temperature, affects metal parts of the performers' paraphernalia causing bolts, rings and steel wires to become brittle. Sometimes during extremely cool weather these metal parts will snap like brittle candy. Apparatus when mounted in several different



Above—The lives of these artists rests on a small metal swivel. Should this snap they would be hurled to their doom on the sawdust ring fifty feet below. Right—The Walkmir Troupe take their lives in their own hands to present this daring feat of juggling.

CIRCUS THRILLERS

directions from a single ring or other fastening will, at times, create an uneven pressure causing the fastening to snap. This has happened in Madison Square Garden, New York City, where several riggings must be guyed from the same fastenings or ring anchors.

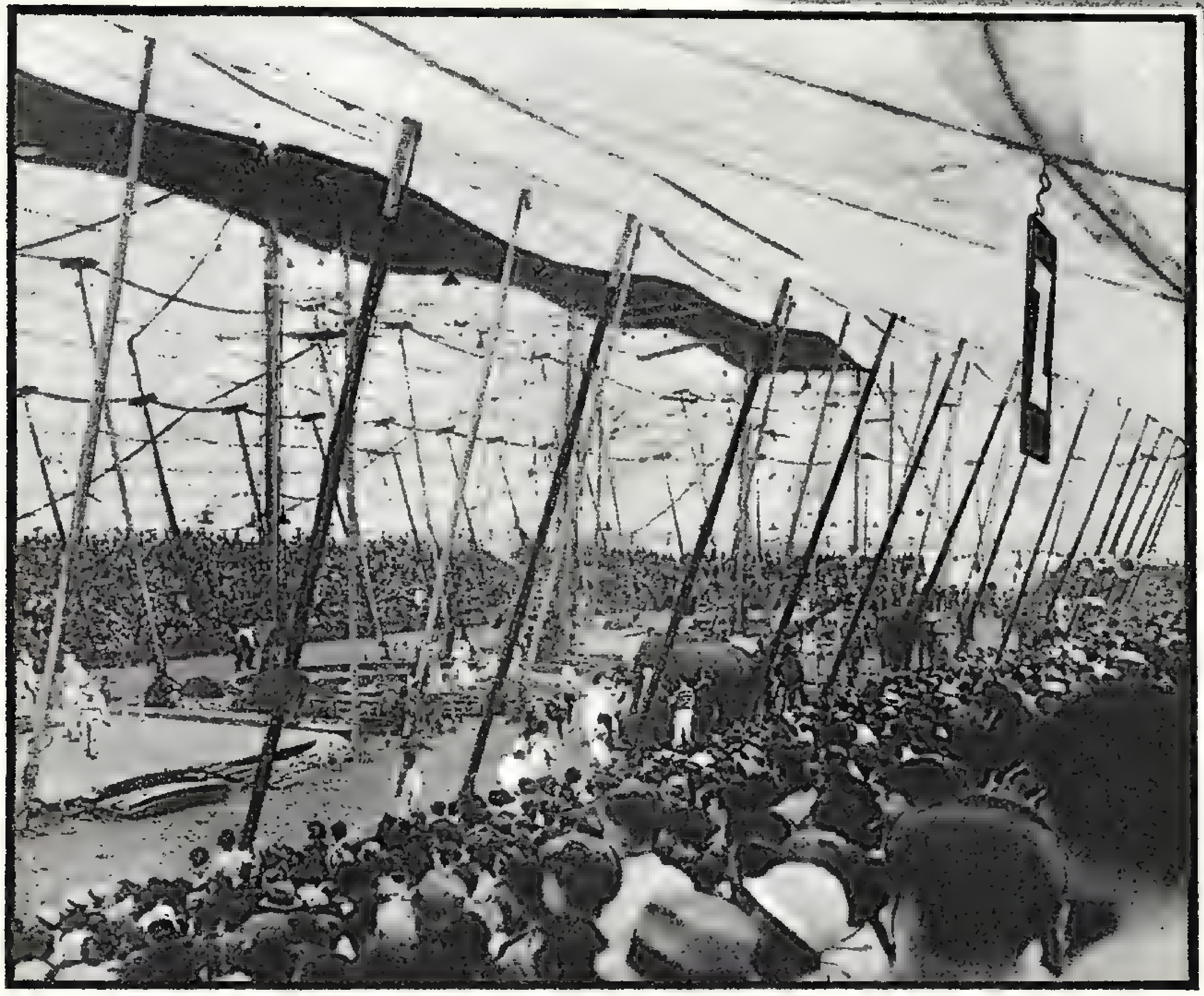
As the circus moves from a low altitude to higher country, the aerialist and acrobats must be on the alert to the lightness of the air or they will over-shoot their marks. In high altitudes leaps and turns can be made with less effort than in low altitudes.

Many of the leading circus performers make their own performing equipment, designing it and then creating it in every mechanical detail. Mechanical perfection, in many cases, is lacking. In some instances bolts and hooks are made too small and not strictly uniform. Inefficient mechanics who do not understand the proper details in constructing metal aerial equipment, are often responsible for accidents beneath the white tops.

There are several professional manufacturers of apparatus for circus performers who cater exclusively to this type of business.

[*Continued on page* 131]

The success of the human cannon ball stunt was largely due to the mechanical genius of the elder Zacchini, an Italian mining engineer. His five sons have been performing this amazing act throughout the world.



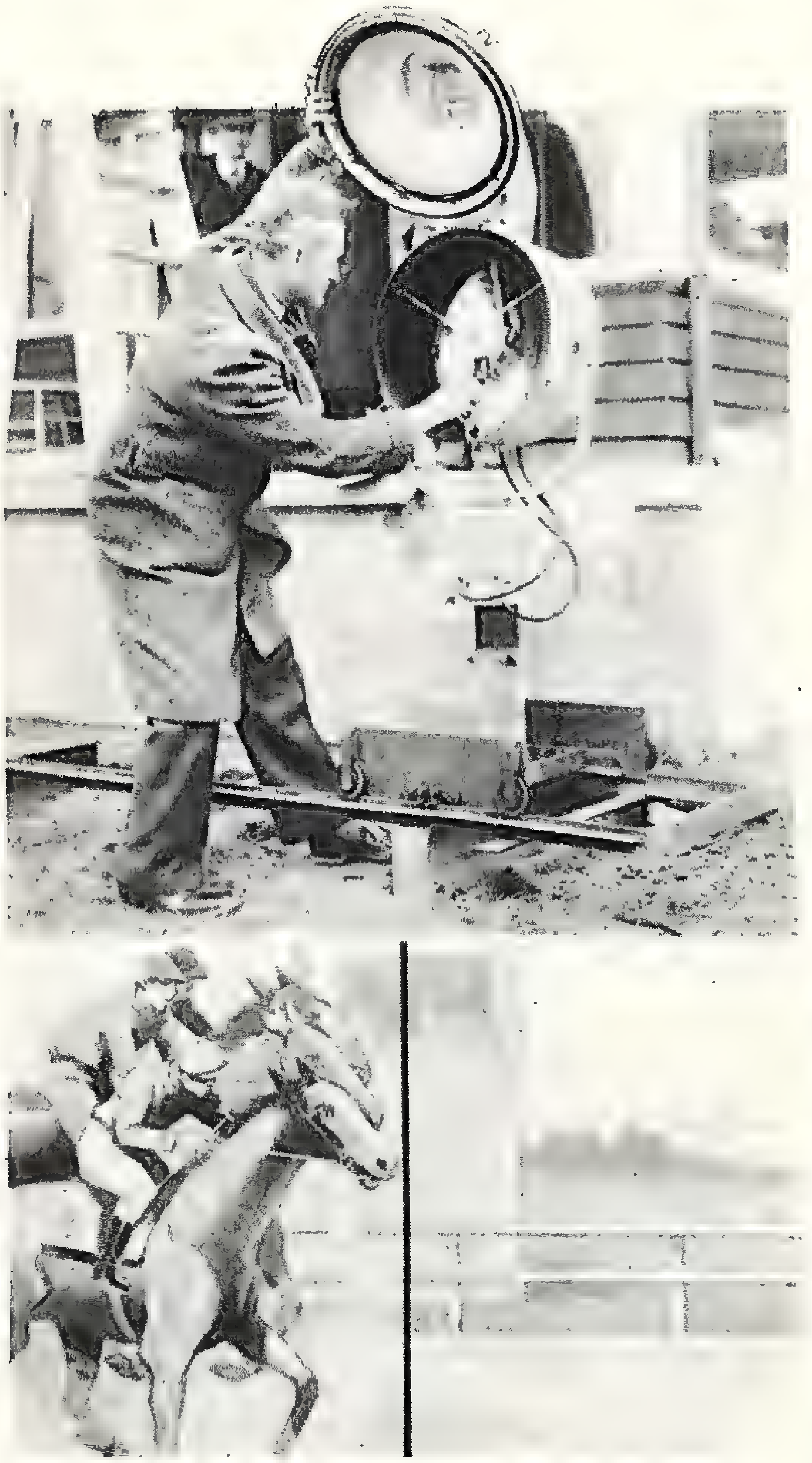
Here in the world's largest tent several score of experienced aerial riggers are constantly on the alert for faulty bars.

Photos copyright
by Ringling Bros.
Barnum & Bailey

Electric Eye Judges Races; Photographs Close Finishes

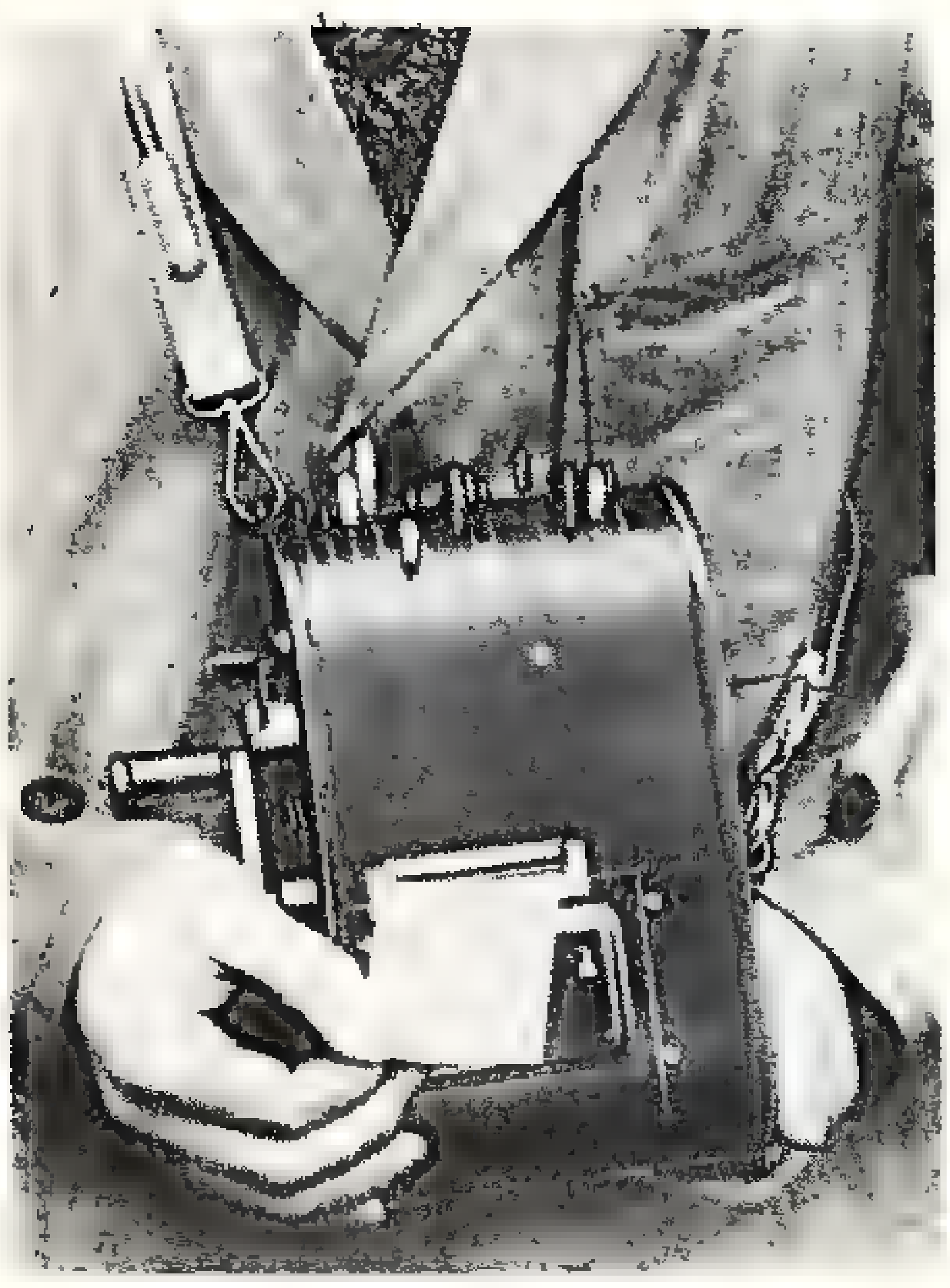
ACCURATE and impartial judging of neck-and-neck finishes at horse races is made possible by means of a new "electric eye" working in co-operation with a camera. The mechanical judge was placed in operation for the first time at the Jamaica Race Track on Long Island.

A wall of light is projected across the track at the finish line, striking upon the electric eye. The first horse to break the wall of light sets off a relay in the "electric eye" which in turn clicks the camera. A pictorial record is thus made which can be studied at leisure, eliminating hasty decisions.



The Jamaica Race Track "electric eye" shown above snaps a picture the instant the winning horse breaks a light beam thrown across the finish line. The lower drawing shows how the end of the race will look to the "electric eye" camera.

Tickets Printed On Midget Press



Tickets and transfers can be printed as needed by this German device. This eliminates punching.

GERMAN bus and street car conductors are now using miniature printing presses in issuing transfers and tickets. The machine, slightly larger than a camera, prints the transfer point, destination, price of ticket and other symbols as needed.

Robot Synchronizes Plane Motors

Mr. Harris is shown here with his airplane motor synchronizer. When all three motors are revolving in unison, three dots in dial appear stationary. Any change in a motor's speed will be shown by a corresponding movement of its dot.

A REVOLVING disk which seems to stop revolving when the engines of a tri-motored plane are operating in unison has been invented by Luther Harris of Central Airlines. The instrument permits pilots to synchronize their motors to within a fraction of a revolution per minute. Vibration is eliminated and air sickness greatly reduced.

Young Detective Smashes Police Ring

Inside lamps, beneath chairs and under desks Jamie rigged his telltale microphones. These led to powerful dictaphones for recording.

Commissioner Warren, left, and Jamie inspect the evidence. Warren has in his hand the pamograph, known as the "mechanical stool pigeon."

Ticker tape unfolded a story of crime for Wallace Jamie. He rigged the ticker to telephone lines, and when a number was dialed, it was tapped off by the ticker detective.

Wallace Jamie, the 27-year-old criminologist who broke up the vice ring in the St. Paul police department, is shown here with an aluminum recording of telephone conversations between the police and members of the city's underworld.

MANY an officer saw stocky, youthful Wallace Jamie about the St. Paul police station the late winter and early spring of 1935 and laughed up their sleeves at his activities.

By midsummer that year, however, they wished sincerely in their hearts they never had heard of him.

For Wallace Jamie was the kind of a kid who liked to play "policeman" with a vengeance as a lad and then grew up to continue playing the game—but playing it for keeps. Before he finished, almost a score of the officers were under indictment and awaiting trial for alleged neglect of duty.

Wallace Jamie went to St. Paul at the behest of Howard Kahn, embattled editor of the *St. Paul Daily News,* and a World War veteran of the French army, and Henry E. Warren, Commissioner of Public Safety, who, at that time, had been just elected to office. St. Paul was rankling under label of "Poison Spot of Crime," placed upon it by Attorney General Homer Cummings. The three men determined that the city must be cleaned up.

In secret conference, it was decided that 27-year-old Jamie, who had majored in police administration and criminal detection at the University of Chicago and Northwestern University, would pose as an efficiency expert making a survey of police methods.

He was given an office in the new public safety building on the floor below Warren's and took with him secret operators whom Kahn had brought to the city previously. To the coppers about the building, he became just another "smart college guy" whose duty it was to go to work on a report that would soon be forgotten.

First he tapped telephone lines.

It was decided next to supplement the tapped telephones with three dictaphones—new, compact, modern, highly sensitive instruments—the position of which should be changed from time to time. These were placed

[*Continued on page* 127]

Win a Soapbox

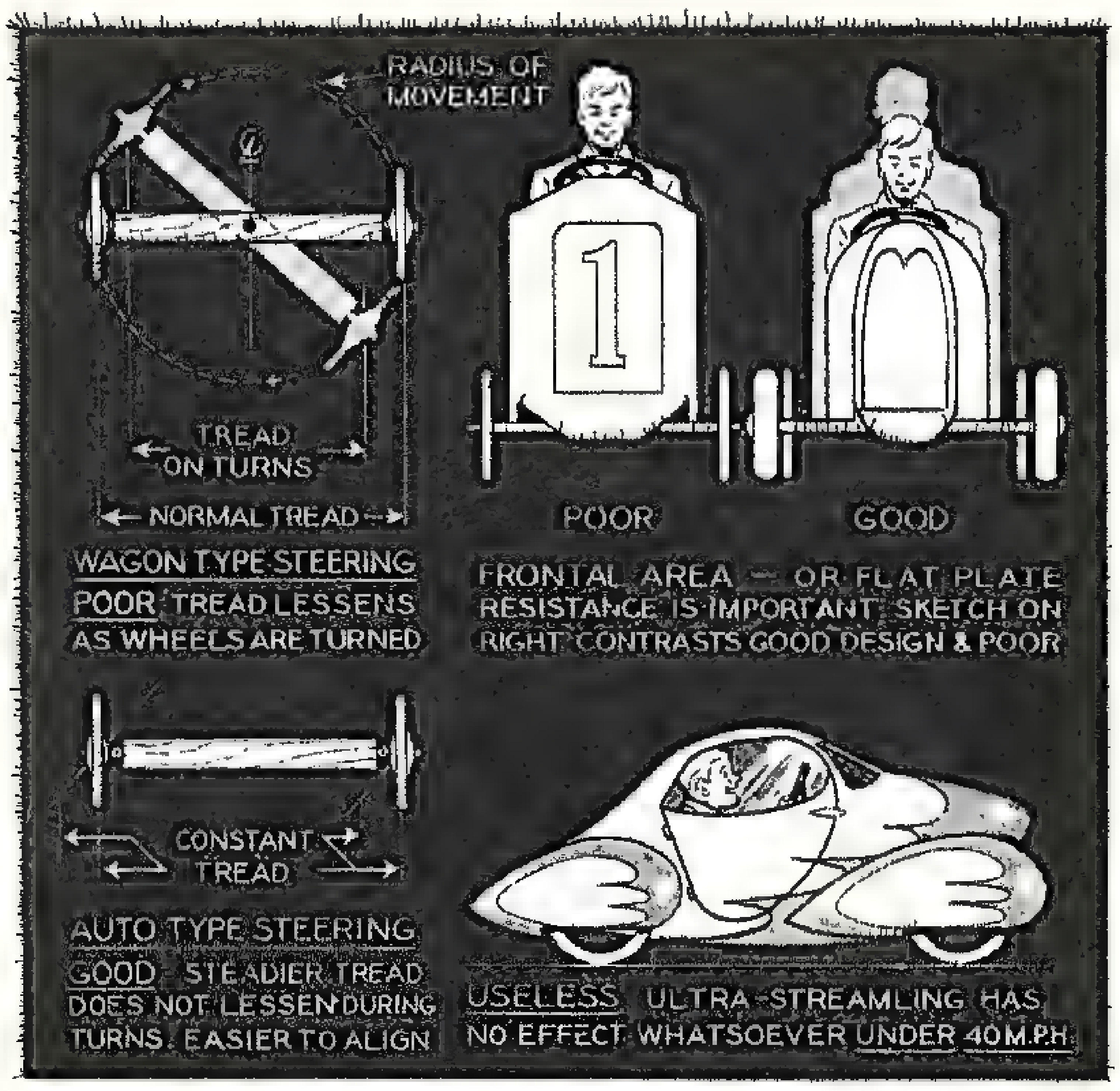
Full speed ahead in an MM Soap Box Racer! This "trike" wheeled speedster is second prize in the contest.

THE PRIZES

First Prize—A scientifically designed Soap Box Racer, complete with Doenut tired wheels.

Second Prize—A Soap Box Racer of same design as above, complete with ball-bearing tricycle wheels.

Third Prize—A set of four Musselman Doenut tired wheels.


RADIUS OF MOVEMENT
TREAD ON TURNS
← NORMAL TREAD →
WAGON TYPE STEERING
POOR TREAD LESSENS AS WHEELS ARE TURNED
1
POOR
GOOD
FRONTAL AREA — OR FLAT PLATE RESISTANCE IS IMPORTANT. SKETCH ON RIGHT CONTRASTS GOOD DESIGN & POOR
CONSTANT TREAD
AUTO TYPE STEERING
GOOD STEADIER TREAD DOES NOT LESSEN DURING TURNS. EASIER TO ALIGN
USELESS ULTRA-STREAMLING HAS NO EFFECT WHATSOEVER UNDER 40 M.P.H.

There is a right and wrong to everything, including soap box racers. Right, in this case, means increased speed and victory.

THE RULES

1. From the letters contained in the three words "Hobbies and Inventions" make as many words as possible. No other letters can be used. List all words in alphabetical order using pen and ink or a typewriter. Neatness will be considered by the judges, but elaborate entries will not influence their decisions.
2. Proper names, foreign words, and slang do not count.
3. In fifty words or less write a letter describing the article you like best in this issue, and what type of article you would like to see most in a future issue.

TWO Soap Box Racers! A set of Musselman doenut tired wheels! These are the three prizes in MM's Soap Box Racer contest. First prize is a scientifically designed racer, fully equipped with doenut tired wheels! Second prize is a racer of the same design, equipped with ball bearing tricycle wheels! And the third prize is a set of four Musselman doenut tires and wheels. The winning of one of these prizes will make you the envy of all the boys in the neighborhood, and will be sure to put you right up in the front ranks in the pushmobile speed contests.

To compete for one of these big prizes, all you have to do is write as many words as you can from the letters contained in three words "Hobbies and Inventions." Proper names, slang, or foreign words will not count. Then write a fifty-word letter or less describing the article you liked best in this issue and why, and what kind of an article you would like to see most in a future issue. Mail your letter and list of words to the Soap Box Derby Contest Editor, MODERN MECHANIX HOBBIES & INVENTIONS, Greenwich, Conn., before June 24. Readers submitting the most words and

RACING CAR!

4. Write your name and address plainly on your entry. No entries will be returned.
5. Webster's New International Dictionary will be used as reference in cases of disputed words.
6. The editors of this magazine will be the judges. Their decisions are final.
7. This contest is open to everyone except employees of Modern Mechanix Publishing Co. and their families.
8. You don't have to buy a copy of this magazine or be a subscriber to enter the contest.
9. Mail your entry to the Soap Box Derby Contest Editor, Modern Mechanix Publishing Co., Greenwich, Conn. Entries for the contest must be postmarked on or before June 24, 1936.

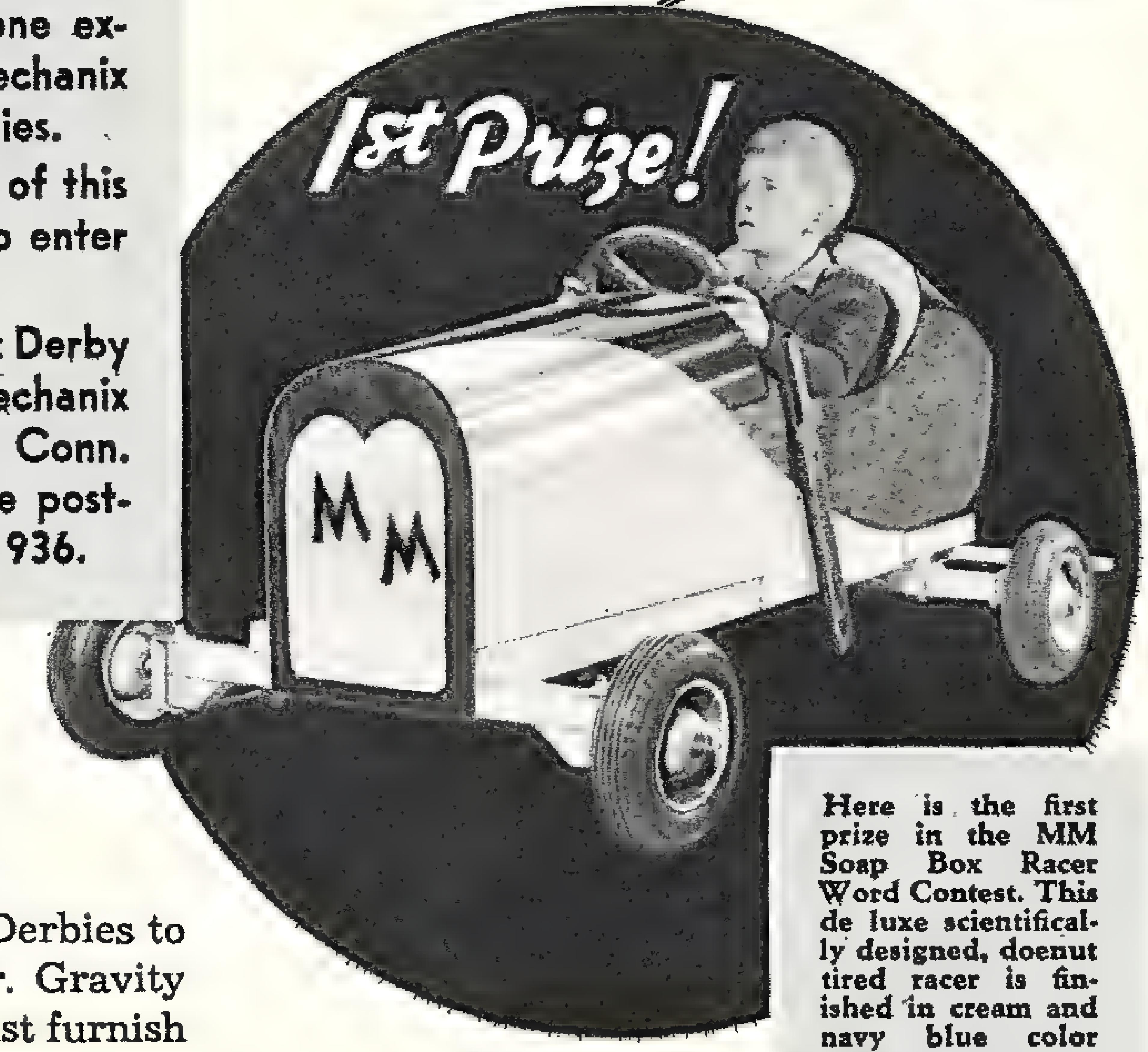
who fulfill other requirements listed in the rules will be awarded the prizes.

Soap Box Racers built on sound engineering principles will prove to be the winners in the Soap Box Derbies to be held all over the country this year. Gravity furnishes the power, but science must furnish the speed.

Naturally, the builder of the winning car will need to exercise considerable ingenuity in getting together his soap box derby entrant. It is with the idea of showing what has been done, and what can be done that this article is written.

All Derbies are rolling races. Pushing is not allowed. Consequently the car will have to be a good coaster before all else. This indicates ball bearings, perfect wheel alignment, perfect braking and smooth steering control.

Indicated also are a rather light weight, perfect load distribution approaching the ideal of weight equally divided on all four wheels, and as little wind resistance as possible. While the latter is not of much mo-



Here is the first prize in the MM Soap Box Racer Word Contest. This de luxe scientifically designed, doenut tired racer is finished in cream and navy blue color with cable brakes.

The third prize. Engineers are agreed that low pressure, pneumatic tired wheels are fastest for soap box racers. Winner of third place in MM's contest will receive a full set of four.

Small Details Decide Soap Box Derby Winners

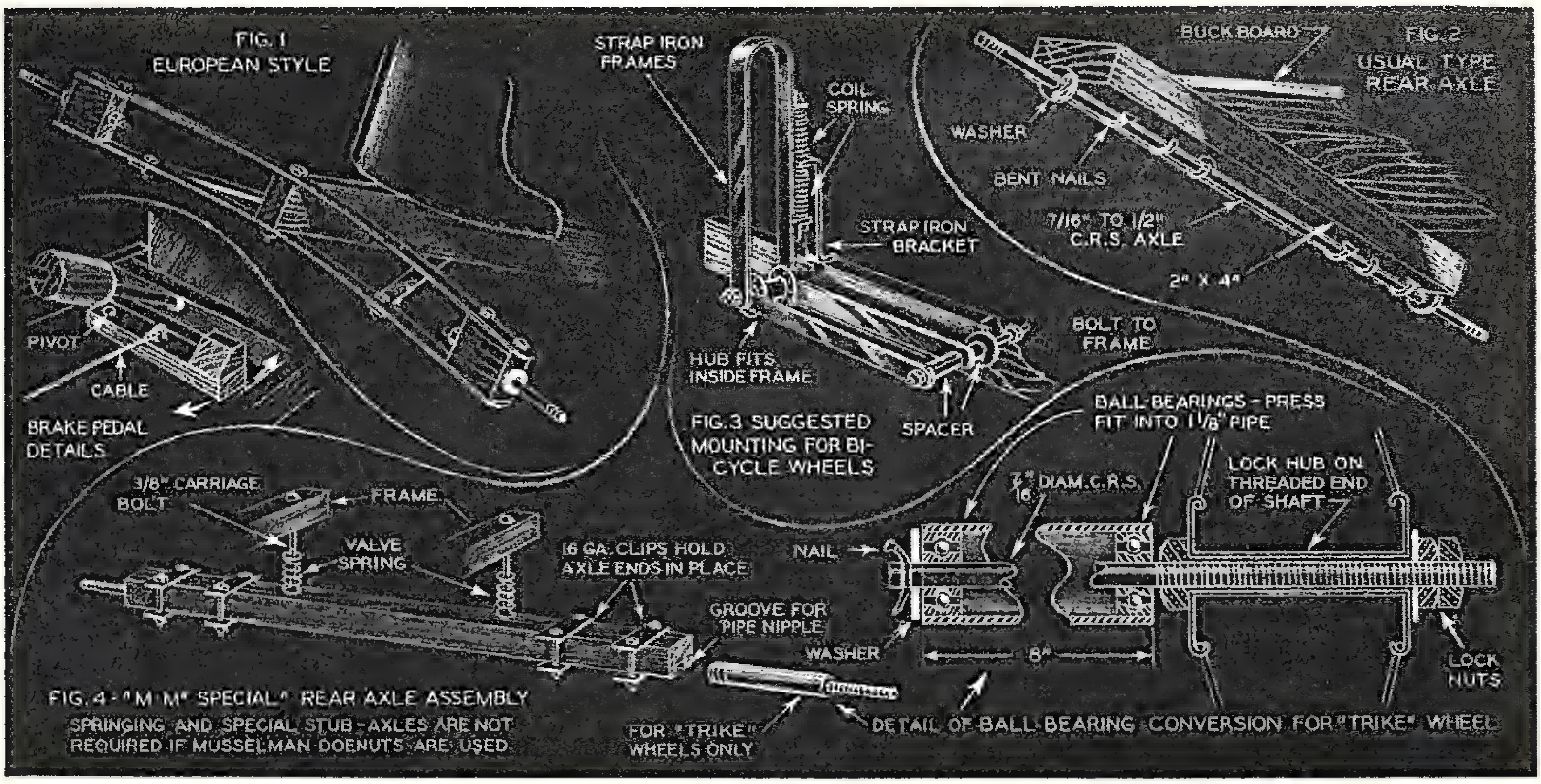


FIG. 1
EUROPEAN STYLE
PIVOT
CABLE
BRAKE PEDAL DETAILS
STRAP IRON FRAMES
COIL SPRING
STRAP IRON BRACKET
HUB FITS INSIDE FRAME
FIG. 3 SUGGESTED MOUNTING FOR BI-CYCLE WHEELS
SPACER
BUCK BOARD
FIG. 2 USUAL TYPE REAR AXLE
WASHER
BENT NAILS
7/16" TO 1/2" C.R.S. AXLE
2" X 4"
BOLT TO FRAME
BALL BEARINGS - PRESS FIT INTO 1 1/8" PIPE
7/16" DIAM. C.R.S.
LOCK HUB ON THREADED END OF SHAFT
NAIL
WASHER
8"
LOCK NUTS
DETAIL OF BALL BEARING CONVERSION FOR "TRIKE" WHEEL
3/8" CARRIAGE BOLT
FRAME
VALVE SPRING
16 GA. CLIPS HOLD AXLE ENDS IN PLACE
GROOVE FOR PIPE NIPPLE
FOR "TRIKE" WHEELS ONLY
FIG. 4 - "M M" SPECIAL" REAR AXLE ASSEMBLY
SPRINGING AND SPECIAL STUB-AXLES ARE NOT REQUIRED IF MUSSELMAN DOENUTS ARE USED

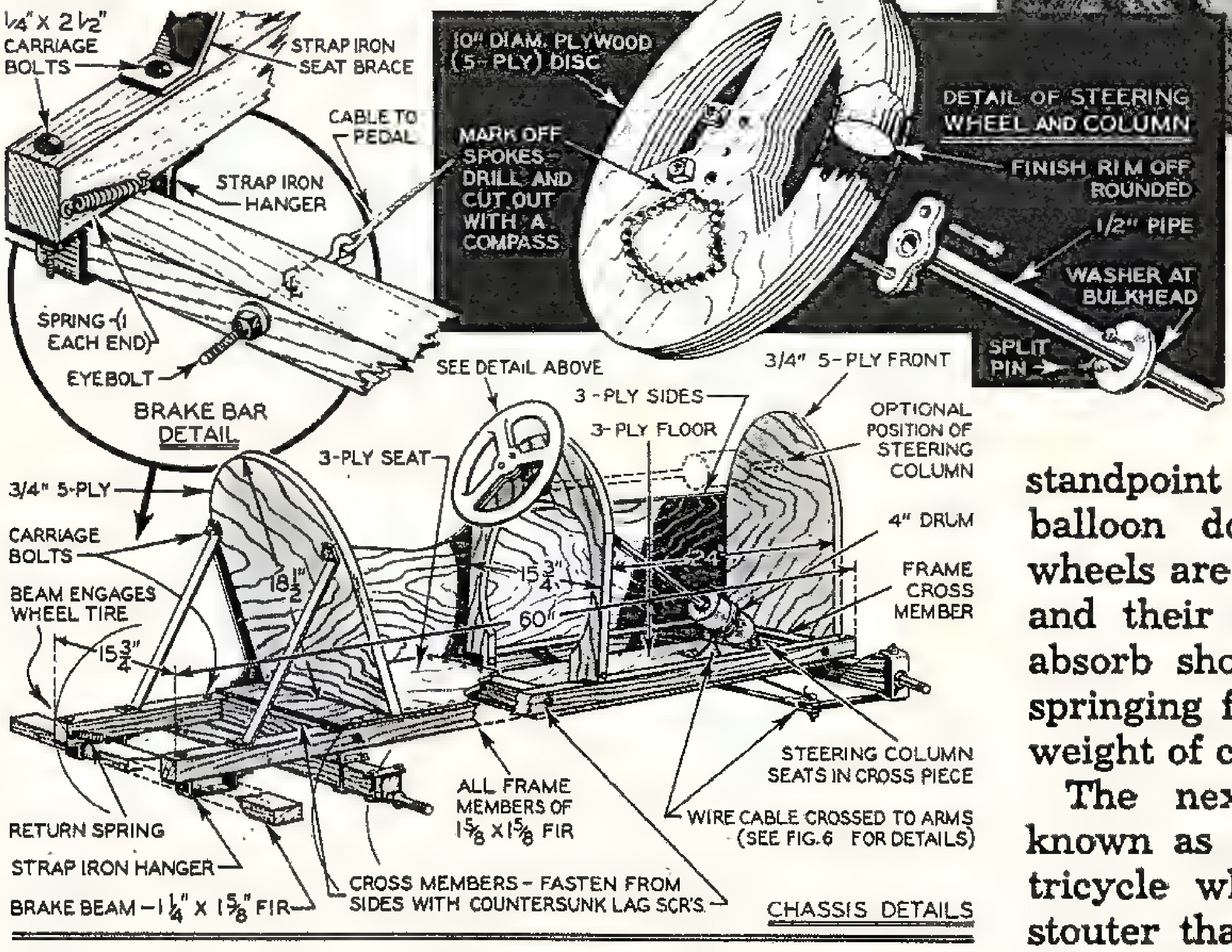
ment it does mean that what is known as "flat plate resistance" should be held at a minimum. Streamlining is of no value at the speeds these cars travel.

To get all these desirable factors we start by looking over the wheels that are available. You can get baby buggy wheels from dumps and junk yards, but invariably they will be off-round in tread, of uneven diameters and will wobble in tracking.

The best wheel from the standpoint of the derby builder is the balloon doenut tired wheel. These wheels are ball-bearing, easy to install, and their soft pneumatic nature will absorb shocks and do away with the springing function, making entire total weight of car practically sprung weight.

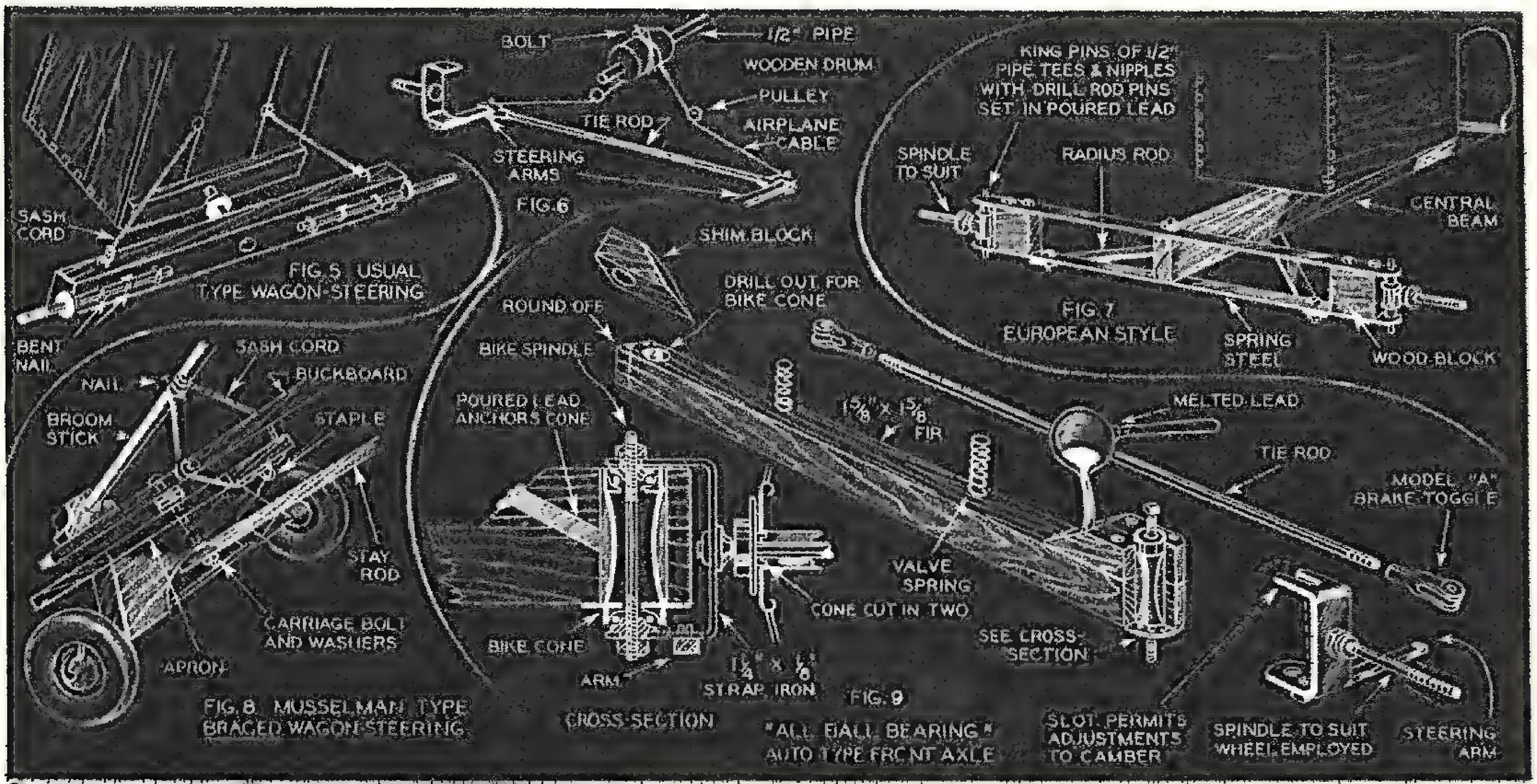
The next best thing is what is known as the 14" diameter "trike" or tricycle wheel. This wheel is much stouter than the ordinary baby buggy wheel, and can be had in any cycle shop. Such a wheel wouldn't stand much

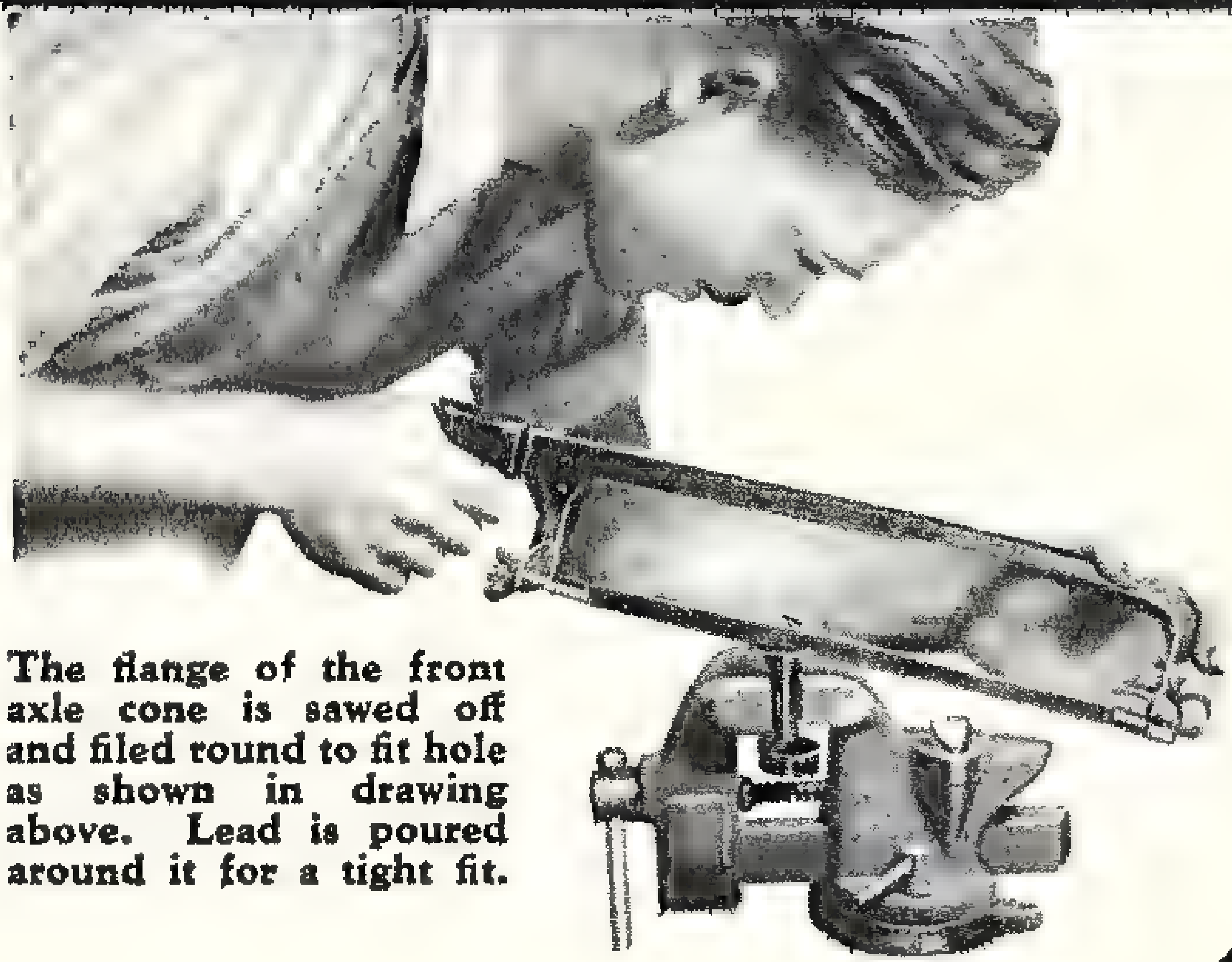
Here a youthful builder is fastening down the brake beam carriage. Also is shown the way in which rear axle is housed in axle beam. Such an axle cannot get out of line.


1/4" X 2 1/2" CARRIAGE BOLTS
STRAP IRON SEAT BRACE
CABLE TO PEDAL
STRAP IRON HANGER
SPRING (1 EACH END)
EYEBOLT
BRAKE BAR DETAIL
10" DIAM. PLYWOOD (5-PLY) DISC
MARK OFF SPOKES - DRILL AND CUT OUT WITH A COMPASS
DETAIL OF STEERING WHEEL AND COLUMN
FINISH RIM OFF ROUNDED
1/2" PIPE
WASHER AT BULKHEAD
SPLIT PIN
SEE DETAIL ABOVE
3/4" 5-PLY FRONT
3-PLY SIDES
3-PLY FLOOR
3-PLY SEAT
OPTIONAL POSITION OF STEERING COLUMN
4" DRUM
FRAME CROSS MEMBER
3/4" 5-PLY
CARRIAGE BOLTS
BEAM ENGAGES WHEEL TIRE
18 1/2"
15 3/4"
15 3/4"
24"
60"
STEERING COLUMN SEATS IN CROSS PIECE
WIRE CABLE CROSSED TO ARMS (SEE FIG. 6 FOR DETAILS)
ALL FRAME MEMBERS OF 1 5/8 X 1 5/8 FIR
RETURN SPRING
STRAP IRON HANGER
BRAKE BEAM - 1 1/4" X 1 5/8" FIR
CROSS MEMBERS - FASTEN FROM SIDES WITH COUNTERSUNK LAG SCR'S.
CHASSIS DETAILS

The chassis, together with steering and brake details are shown here. The steering wheel can be made of five-ply wood or two layers of three-ply. Fir is used for frames and three-ply wood for floor.

Drawings Show Strength, Speed of MM Racer


BOLT
1/2" PIPE
WOODEN DRUM
PULLEY
TIE ROD
AIRPLANE CABLE
STEERING ARMS
FIG. 6
SASH CORD
FIG. 5 USUAL TYPE WAGON-STEERING
BENT NAIL
SHIM BLOCK
DRILL OUT FOR BIKE CONE
ROUND OFF
BIKE SPINDLE
KING PINS OF 1/2" PIPE TEES & NIPPLES WITH DRILL ROD PINS SET IN POURED LEAD
SPINDLE TO SUIT
RADIUS ROD
CENTRAL BEAM
FIG. 7 EUROPEAN STYLE
SPRING STEEL
WOOD BLOCK
SASH CORD
BUCKBOARD
NAIL
BROOM STICK
STAPLE
STAY ROD
CARRIAGE BOLT AND WASHERS
APRON
FIG. 8 MUSSELMAN TYPE BRACED WAGON-STEERING
POURED LEAD ANCHORS CONE
BIKE CONE
ARM
CROSS-SECTION
1¼" x ⅛" STRAP IRON
1⅝" x 1⅝" FIR
MELTED LEAD
TIE ROD
MODEL "A" BRAKE TOGGLE
VALVE SPRING
CONE CUT IN TWO
SEE CROSS-SECTION
FIG. 9
"ALL BALL BEARING" AUTO TYPE FRONT AXLE
SLOT PERMITS ADJUSTMENTS TO CAMBER
SPINDLE TO SUIT WHEEL EMPLOYED
STEERING ARM

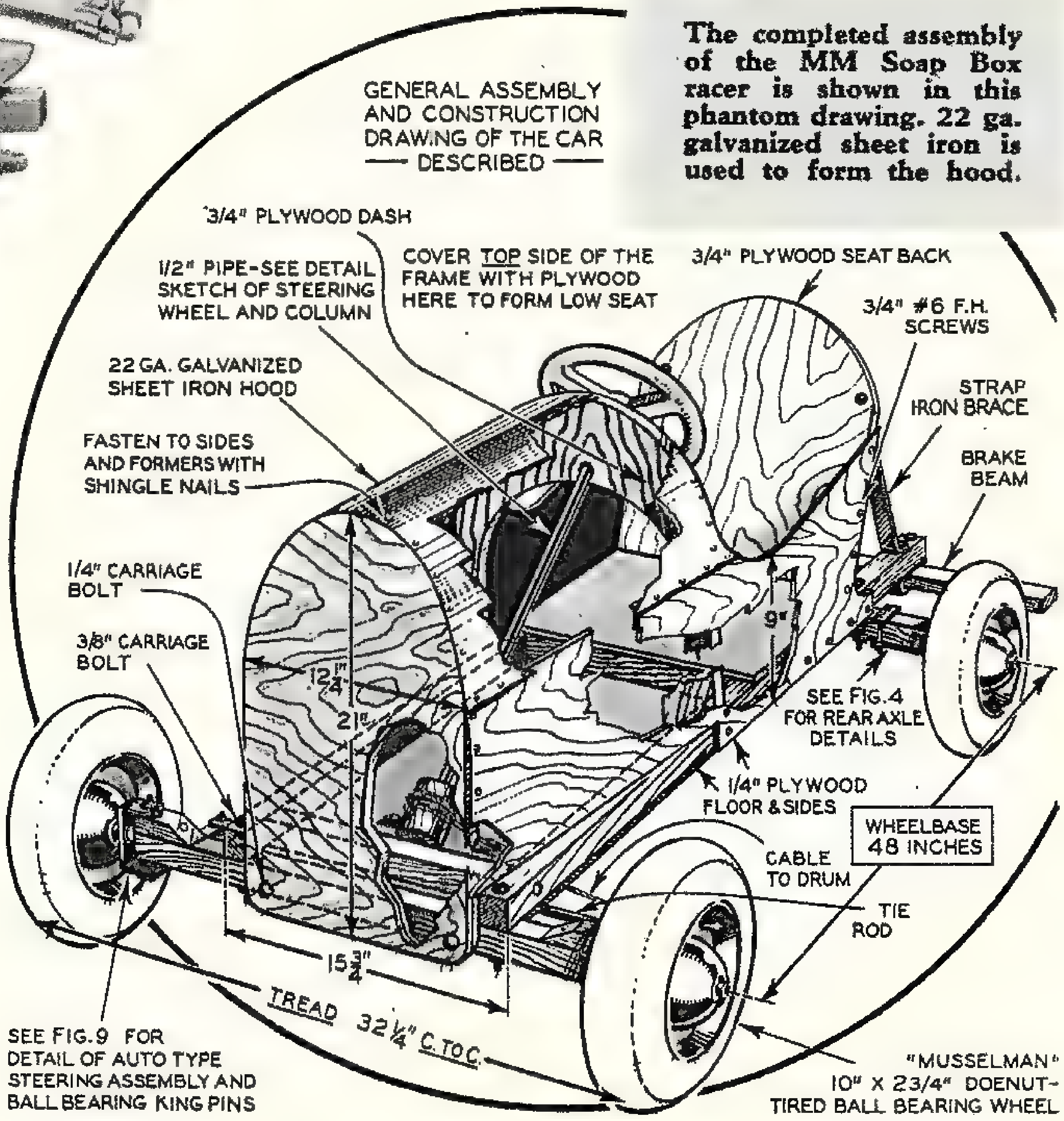


The flange of the front axle cone is sawed off and filed round to fit hole as shown in drawing above. Lead is poured around it for a tight fit.

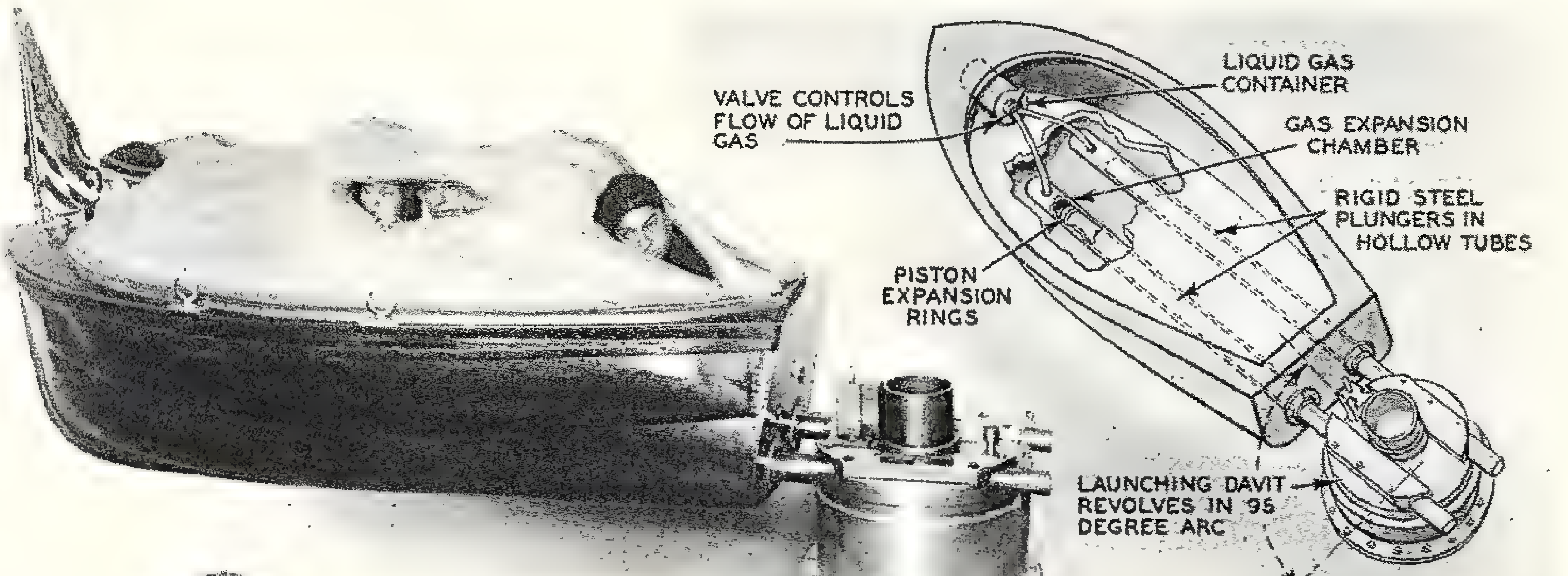
of a chance of winning a national event with its flat, long greased bearing surface, so we must needs make it a ball-bearing job. This can be done, in the rear wheels, by threading the $\frac{7}{16}$" cold rolled steel axle for a length that will accommodate the hub and locknuts. The wheel is bolted securely to the axle. The axle turns in ball bearings that are inserted in a pipe nipple. See Figure 4. These bearings are "trike" bearings, costing from 12 cents to 25 cents each. You will find you can insert them snugly in a 1⅛" outside diameter water or gas pipe nipple. The end of the axle is washered and pinned. The nipple is set in a groove in a 1⅝"x1⅝" fir axle (commonly called 2x2) and is retained by ⅛"x1¼" strap iron clips bolted together as shown with s. a. e. auto bolts costing about 3 cents each, obtainable at auto supply houses. This assembly gives a stout wheel, of perfect align-

[*Continued on page* 132]

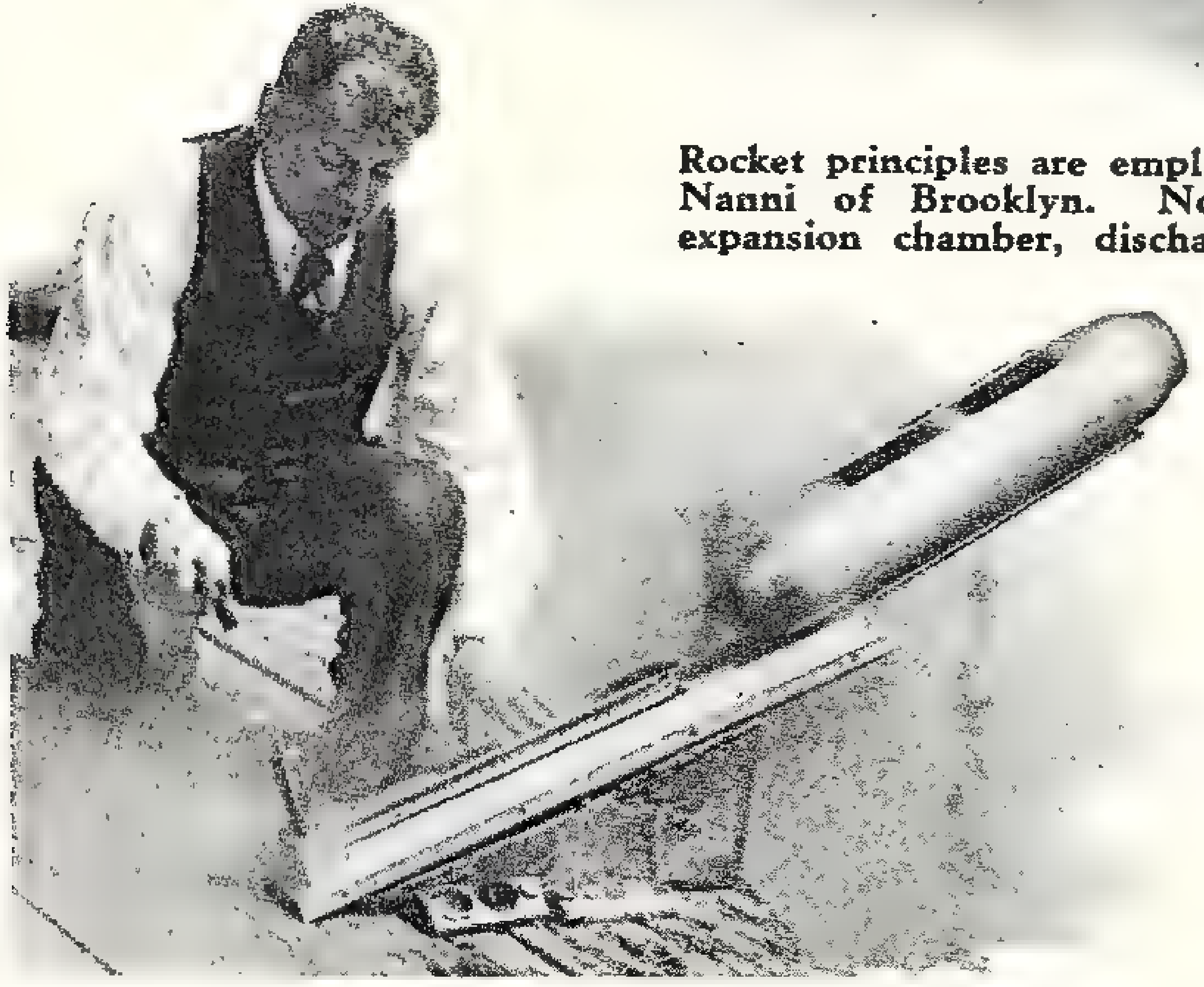
The completed assembly of the MM Soap Box racer is shown in this phantom drawing. 22 ga. galvanized sheet iron is used to form the hood.


GENERAL ASSEMBLY AND CONSTRUCTION DRAWING OF THE CAR — DESCRIBED —
3/4" PLYWOOD DASH
1/2" PIPE-SEE DETAIL SKETCH OF STEERING WHEEL AND COLUMN
COVER TOP SIDE OF THE FRAME WITH PLYWOOD HERE TO FORM LOW SEAT
3/4" PLYWOOD SEAT BACK
3/4" #6 F.H. SCREWS
22 GA. GALVANIZED SHEET IRON HOOD
STRAP IRON BRACE
FASTEN TO SIDES AND FORMERS WITH SHINGLE NAILS
BRAKE BEAM
1/4" CARRIAGE BOLT
3/8" CARRIAGE BOLT
9"
12¾"
21½"
SEE FIG. 4 FOR REAR AXLE DETAILS
1/4" PLYWOOD FLOOR & SIDES
WHEELBASE 48 INCHES
CABLE TO DRUM
TIE ROD
15¾"
TREAD 32¼" C. TO C.
SEE FIG. 9 FOR DETAIL OF AUTO TYPE STEERING ASSEMBLY AND BALL BEARING KING PINS
"MUSSELMAN" 10" X 2 3/4" DOENUT-TIRED BALL BEARING WHEEL

Rocket Launches New Type Lifeboat From Ship's Deck


VALVE CONTROLS FLOW OF LIQUID GAS
LIQUID GAS CONTAINER
GAS EXPANSION CHAMBER
RIGID STEEL PLUNGERS IN HOLLOW TUBES
PISTON EXPANSION RINGS
LAUNCHING DAVIT REVOLVES IN 95 DEGREE ARC

Rocket principles are employed in launching this new type lifeboat invented by Menotti Nanni of Brooklyn. Non-perishable liquid gas explodes when released into the expansion chamber, discharging the boat as shown in the diagram pictured at right.



Nanni here demonstrates how his 10 passenger, steel lifeboat will be launched. Rubber cushions will reduce starting and landing shock. The boat cannot turn or twist in the air.

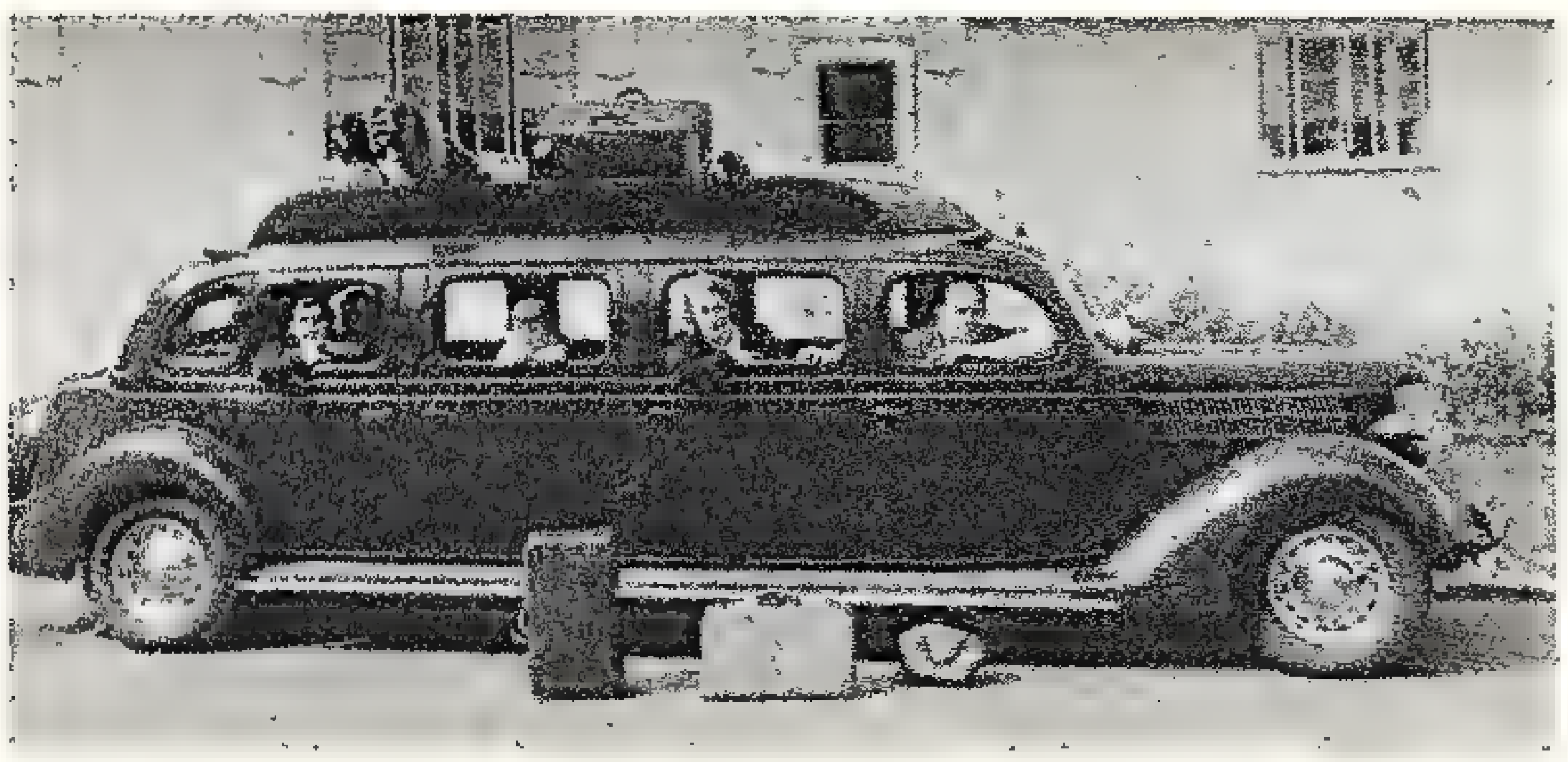
A ROCKET type lifeboat which can be shot over the side of the ship instead of being slowly launched from davits has been invented by Menotti Nanni, of Brooklyn, N. Y.

In tests conducted on models, he has shown that the boat will not turn or twist in the air. In the full size life boats rubber cushions and other supports will take up the initial jolt as the boat leaves the deck, while the forward momentum coupled with the hull design will eliminate shock as the boat skims into the water.

The boats will be held in place on deck by two steel plungers running through tubes in the hull parallel to the keel. In launching the plungers are pivoted over the side of the ship, and liquid gas released into the tubes. This explodes against the plungers and the lifeboat is catapulted into the sea. Nanni took his family with him in a demonstration May 10.

"Family Bus" Carries 11 Passengers

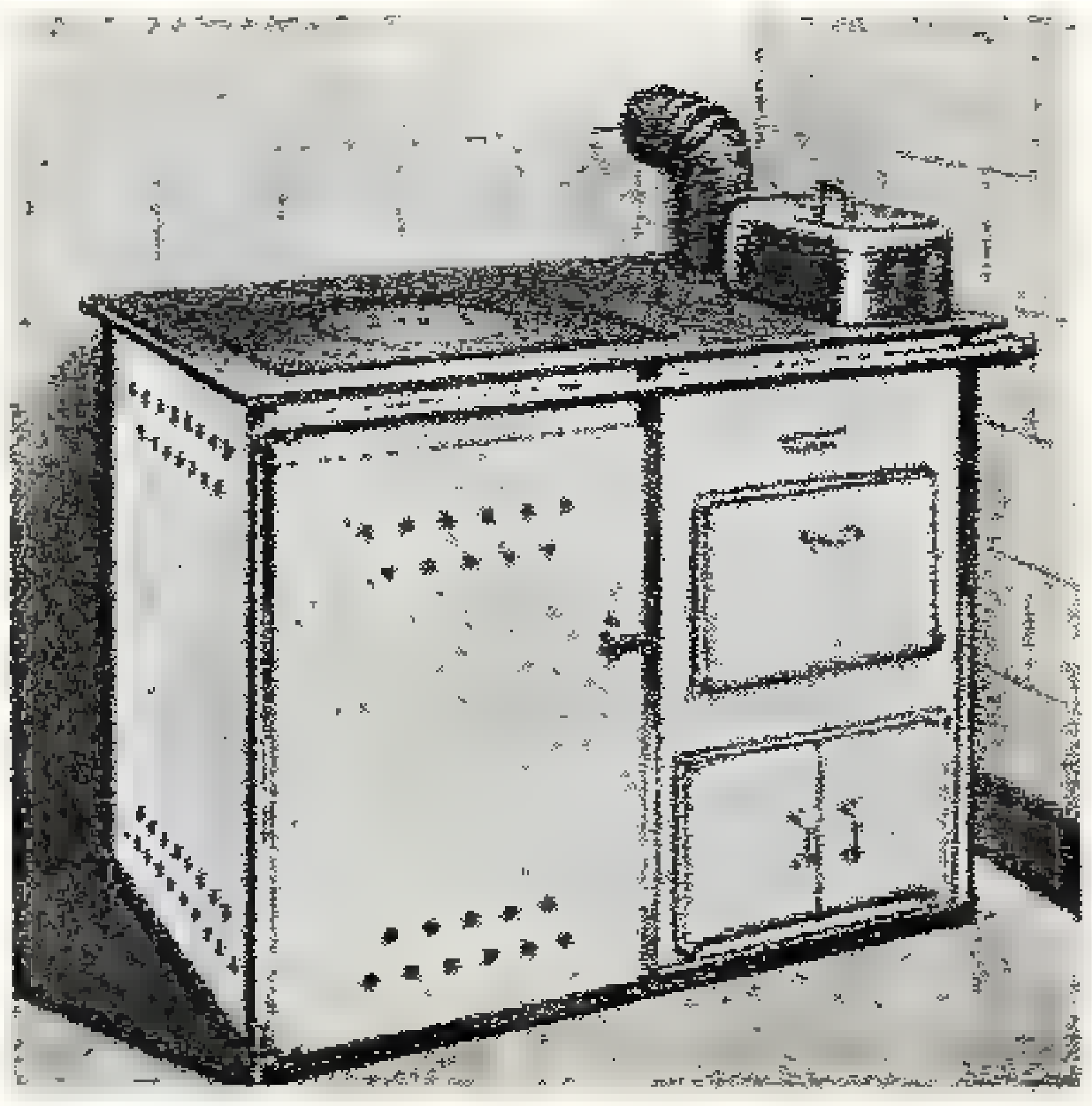
THE "family bus" now becomes a fact, and not just a term applied to the car in the family garage. One of the first of these extended Ford cars was purchased by Wallace Beery for use as a private bus and station wagon. It is 22 feet long and carries 11 passengers in four wide seats. Brakes are of the air booster type.



Wallace Beery is shown here with his new "family bus." It carries 11 passengers, has four wide seats, air booster brakes, De Palma safety rims for front tires and a Ford motor.

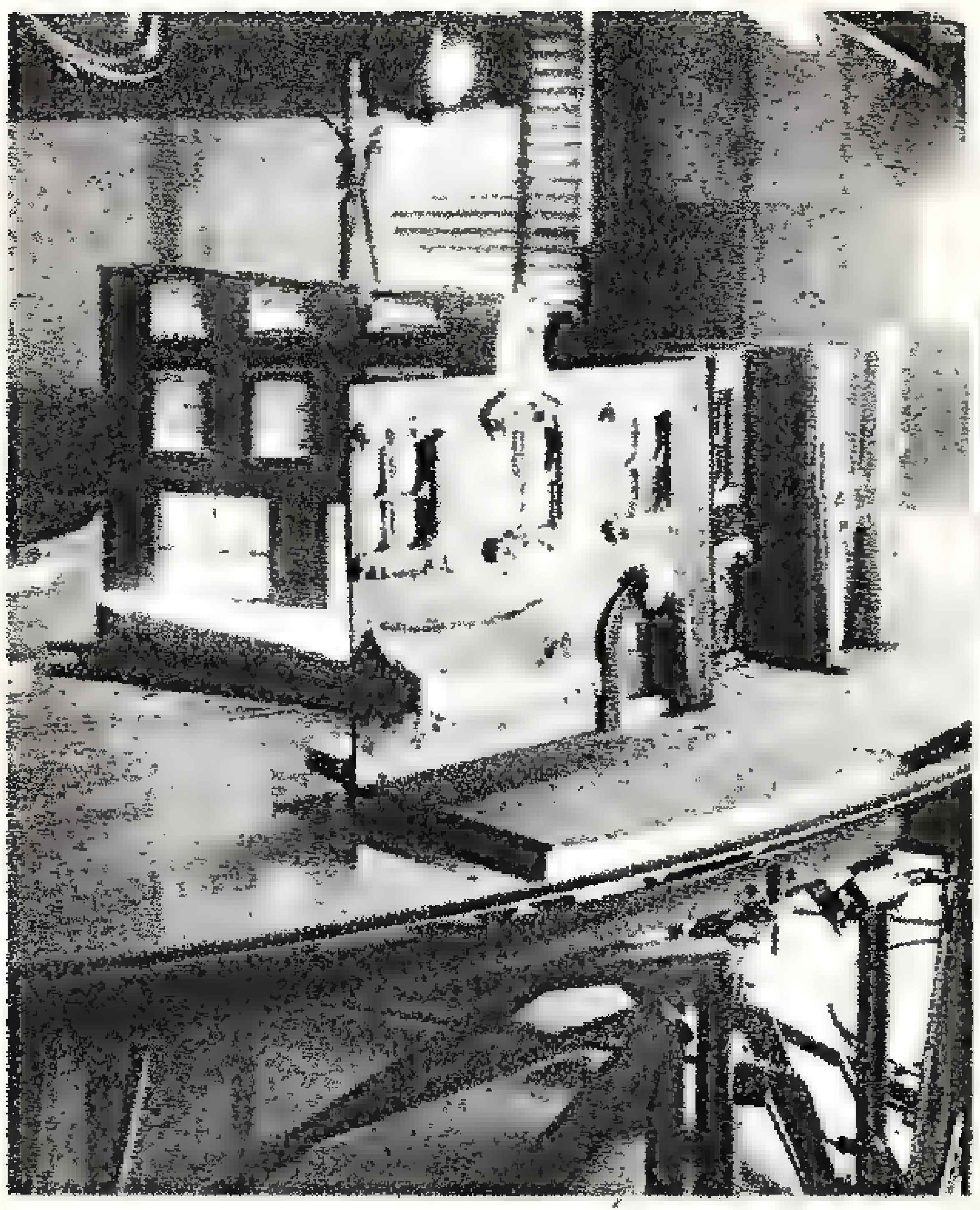
Sootless Cook Stove Burns Sawdust

SAW dust, shavings, peat, old leaves or any waste material forms the fuel for a new slow-burning stove invented in Germany. Stove consumes everything, producing a uniform heat without soot.



Sawdust forms the fuel for this slow-burning German cook stove. It produces no soot or smoke.

MOVIE CARTOONS Gain THIRD Dimension

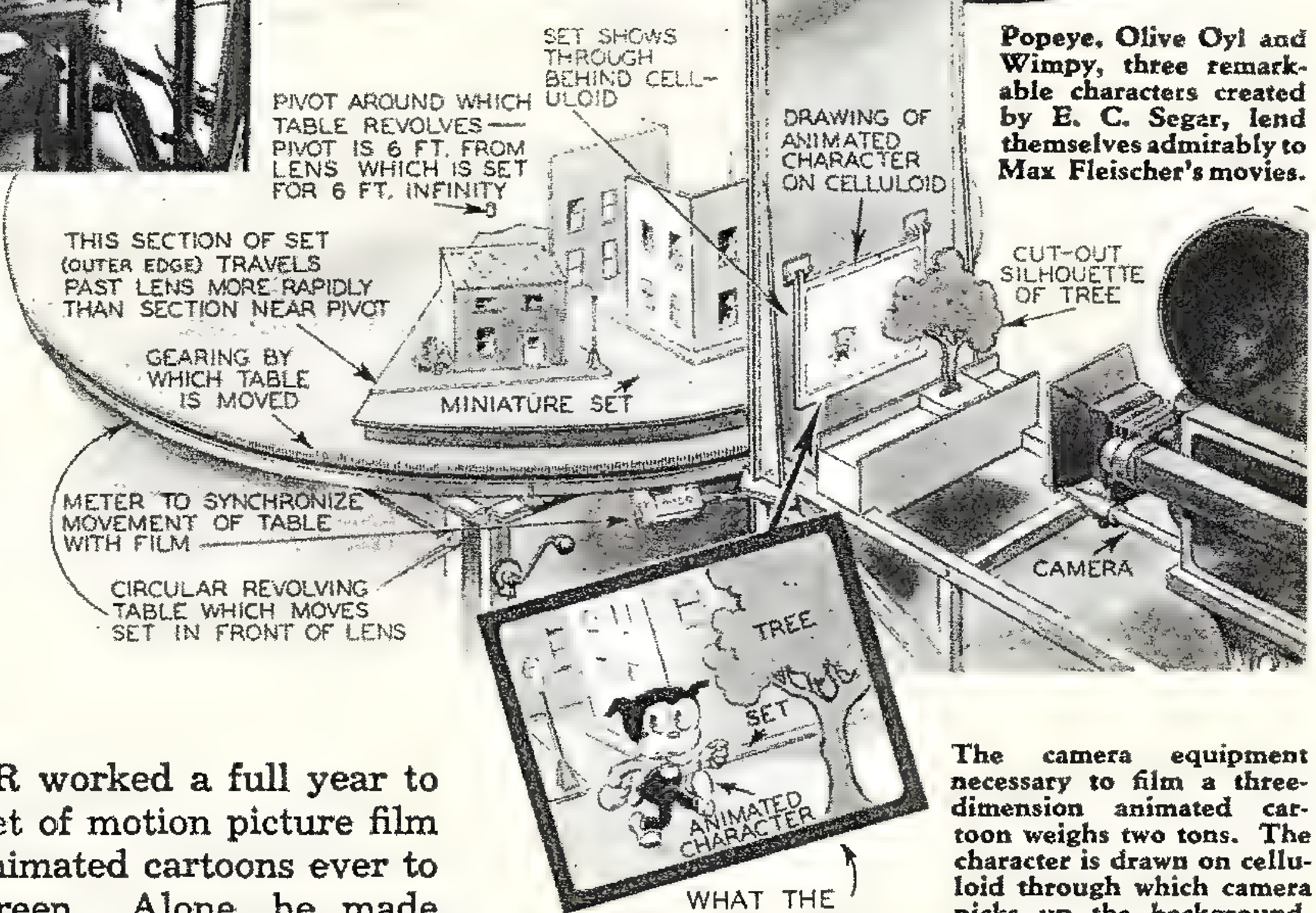


Three-dimensional animated cartoons are produced on this miniature set. The houses are not built to scale, the buildings in the foreground being much shorter and wider than those nearer the pivot. The camera perspective remedies this and the result is a picture creating all the illusion of three dimensions. Cartoon character is placed in a slide mounted between camera and set.

Max Fleischer, cartoonist, inventor, mechanic and animated movie director, confers with Pudgy, one of his famous characters.

Popeye, Olive Oyl and Wimpy, three remarkable characters created by E. C. Segar, lend themselves admirably to Max Fleischer's movies.

Popeye cartoon courtesy of King Features


SET SHOWS THROUGH BEHIND CELLULOID
PIVOT AROUND WHICH TABLE REVOLVES—PIVOT IS 6 FT. FROM LENS WHICH IS SET FOR 6 FT. INFINITY
DRAWING OF ANIMATED CHARACTER ON CELLULOID
THIS SECTION OF SET (OUTER EDGE) TRAVELS PAST LENS MORE RAPIDLY THAN SECTION NEAR PIVOT
CUT-OUT SILHOUETTE OF TREE
GEARING BY WHICH TABLE IS MOVED
MINIATURE SET
METER TO SYNCHRONIZE MOVEMENT OF TABLE WITH FILM
CAMERA
CIRCULAR REVOLVING TABLE WHICH MOVES SET IN FRONT OF LENS
TREE
SET
ANIMATED CHARACTER
WHAT THE CAMERA SEES

The camera equipment necessary to film a three-dimension animated cartoon weighs two tons. The character is drawn on celluloid through which camera picks up the background.

MAX FLEISCHER worked a full year to produce 250 feet of motion picture film on one of the first animated cartoons ever to reach the silver screen. Alone, he made thousands of drawings, wrote the story, and did the photography. The animated cartoon was "Out of the Ink Well." It made movie history just after the World War.

Today he has a staff of 225 people who turn out a 650-foot animated cartoon every ten days. All of them are in sound, many in color and, latest of all, with three dimensions. The famous "Popeye the Sailor" animateds are leaders in the field; "Betty Boop," "Ko-Ko the Klown," and the familiar Screen Songs with the famous bouncing ball are known to every movie-goer. They are released through Paramount Pictures Corporation.

Max Fleischer's story reveals the almost unlimited opportunities which await the man who adopts cartooning as a profession. He began his career as a $2-a-week errand boy in the art department of the *Brooklyn Eagle*, later becoming cartoonist on that paper. One of his early cartoon strips was "E. K. Sposher, the Kodak Fiend."

He has always been mechanically inclined and of an inventive disposition. His latest patent gives an effect of three dimensions to cartoons.

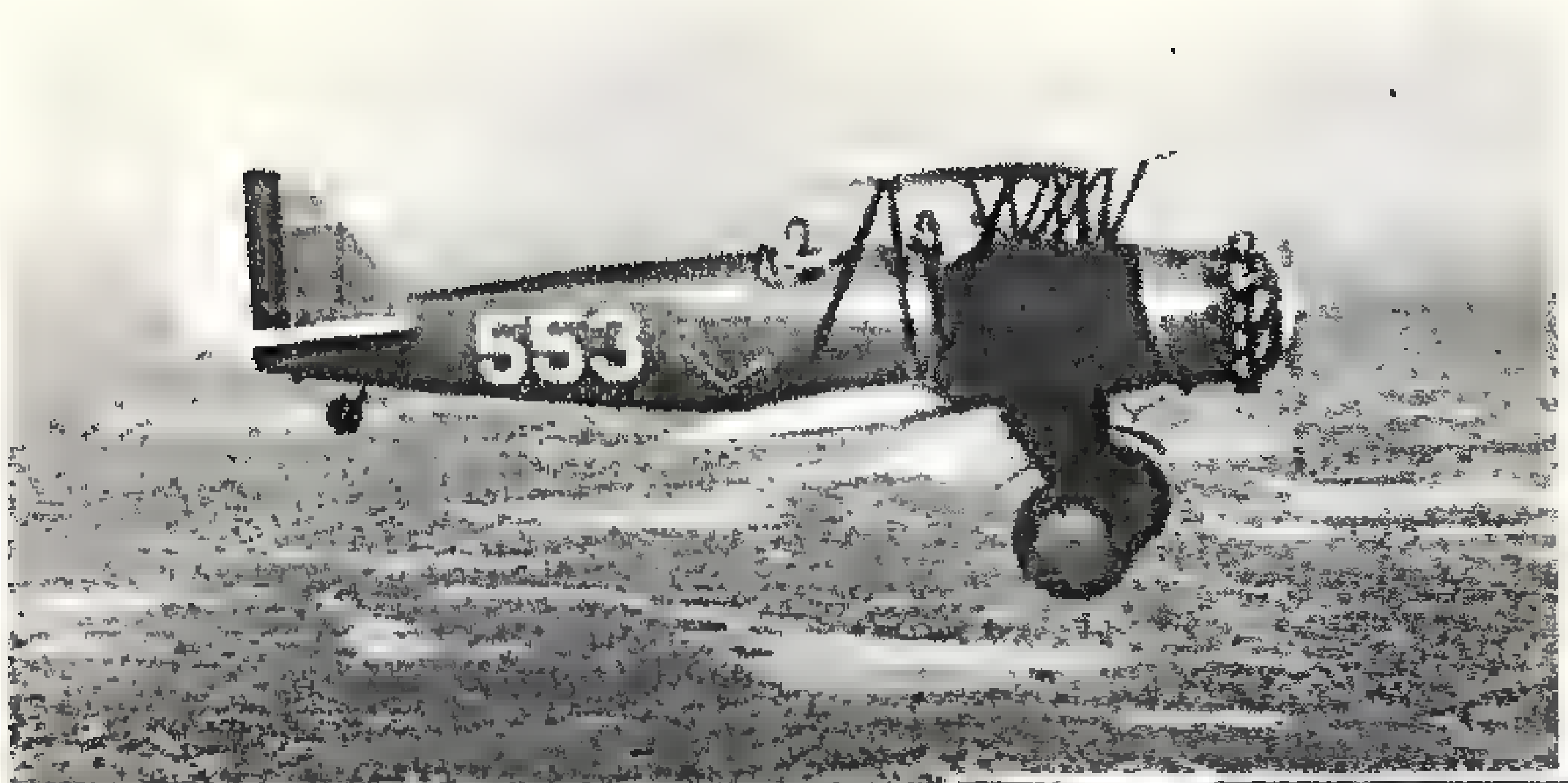
After the drawings are completed they are photographed in sequence, usually against a water color background which remains stationary, the cartoon characters being superimposed upon it in several celluloid layers. It is just at this point that Mr. Fleischer's new three-dimensional illusion figures.

Upon a table are placed miniature sets, constructed with microscopic accuracy. The sets are built in segments shaped like a piece of pie. They are not built to scale—this is

[*Continued on page* 132]

Brig. Gen. H. H. ARNOLD

Aviation, the giant infant of Industry, challenges youth to find jobs within its many fields. Where? How? Brig. Gen. H. H. Arnold, former aviation editor of MM, and Major Ira Eaker tell you in this chapter of their book, "This Flying Game," published by Funk and Wagnalls.

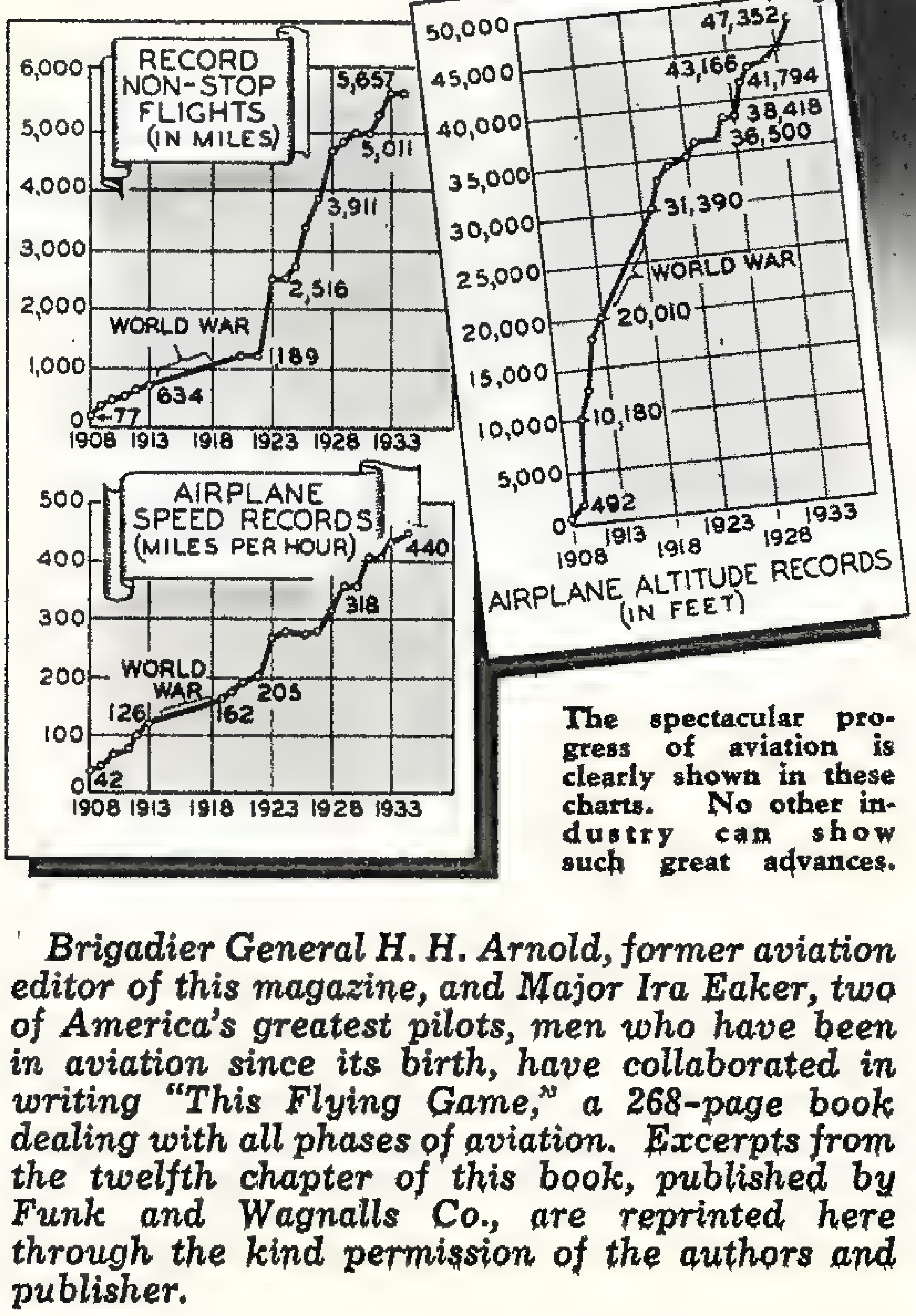


After months of intensive ground schooling, the student pilot takes off on a dual instruction flight.

Parachuting. It is not as dangerous as it looks, experienced jumpers claim. Parachutes are life rafts of aviation.

The young pilot, having graduated from dual instruction, is ready for his first solo.

Charts and U. S. Army Air Corps photos reprinted by courtesy of the Funk and Wagnalls Company.



The spectacular progress of aviation is clearly shown in these charts. No other industry can show such great advances.

Brigadier General H. H. Arnold, former aviation editor of this magazine, and Major Ira Eaker, two of America's greatest pilots, men who have been in aviation since its birth, have collaborated in writing "This Flying Game," a 268-page book dealing with all phases of aviation. Excerpts from the twelfth chapter of this book, published by Funk and Wagnalls Co., are reprinted here through the kind permission of the authors and publisher.

AVIATION is an industry. It includes many trades and a few professions within its extensive realm. In addition, many of the old and long-established trades and professions have fresh pastures opened up to them as a direct result of this new industry and its demands and opportunities.

The uninitiated are prone to look upon aviation as merely a collection of pilots. Flying machines and flying men form the complete popular conception of the industry. Too many of us overlook the many men and the varied types of human occupation required to give these airmen something to ride.

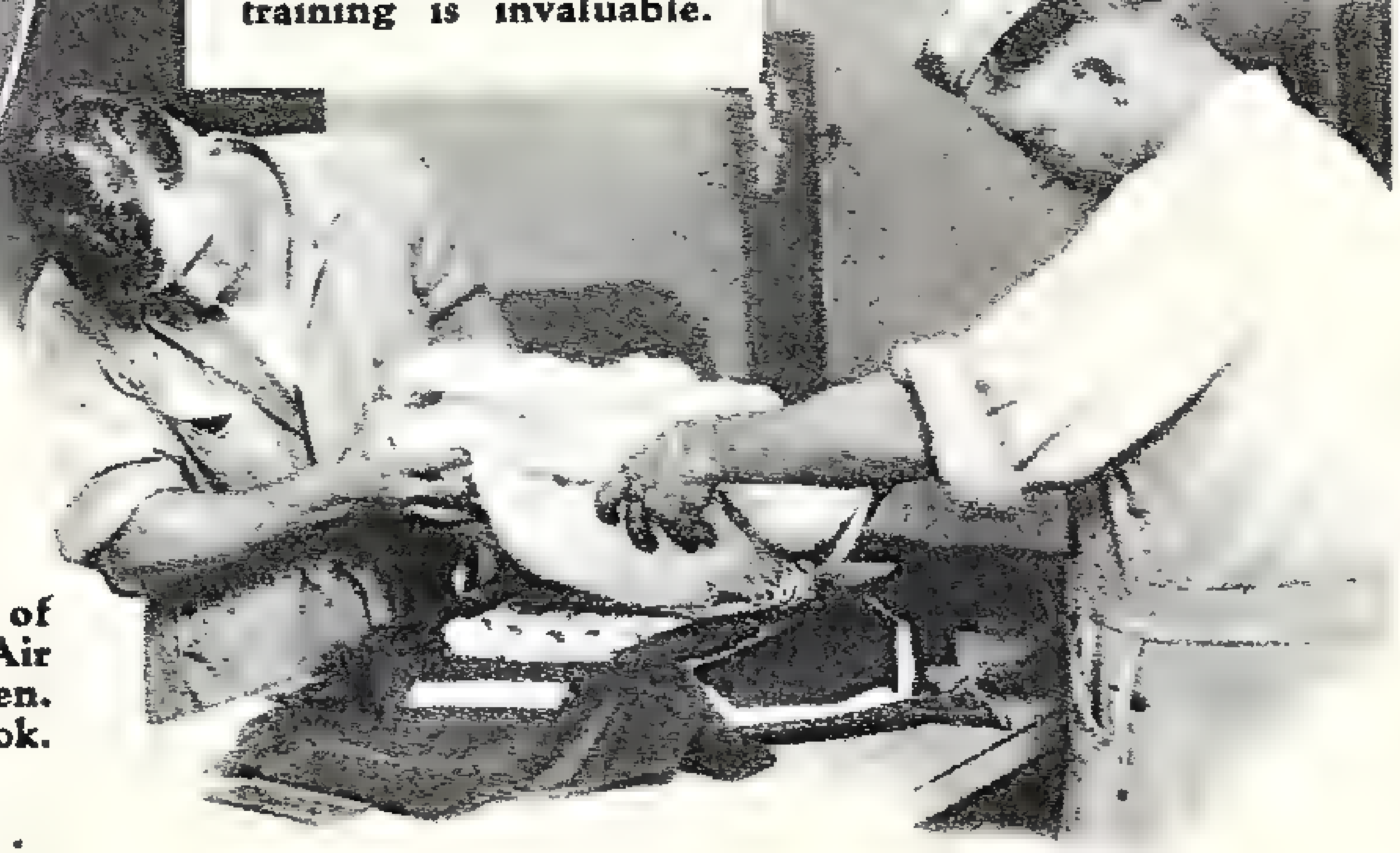
Let us outline, briefly, this new field of endeavor; let us follow the tentacles of the octopus and thus learn something of the magnitude of the creature.

On a western airport stands a magnificent plane, ready for a mad dash across the continent tomorrow. Consider that plane. It is a complete vessel but it is composed of a multitude of co-related parts, accessories and complete mechanical assemblies. That machine took a year in the building. First it originated in the mind of an airplane designer; then it was transferred to plotting board by skilled draftsmen. These blueprints, upon being reproduced in manifold and transferred to the factory floor, set more than a hundred men at work on the plane alone. Before actual work can begin, a model of wood, complete in every detail, called a mock-up, must be built up by carpenters and skilled wood workers. This mock-up is then delivered to the metal workers, who duplicate it in dural, since the fuselage or body of

Surveys The FLYING Game

Here is Brigadier General H. H. Arnold, co-author of this article and assistant chief of the United States Army Air Corps. All phases of aviation are covered by Brig. Gen. Arnold and his collaborator, Major Ira Eaker, in their book.

Aerial photography comprises no small part in the training of tomorrow's pilots. In war or peace this training is invaluable.



For almost every hour in the air the student-pilot spends at least 10 on the ground, learning aviation from A to Z. Here two are mastering the art of folding a silk parachute.

the structure will probably be entirely of this material. This requires work by practically every type of artisan known to the metal trades—rollers, cutters, riveters, and formers.

After the completed fuselage is rolled upon the assembly floor its power-plant installation begins. Other mechanics install an instrument board, carrying more than twenty instruments and gauges. Others install windows, sound-proof the cabin, and complete the whole with seats and upholstery.

The engine comes to the airplane factory as a complete assembly, but its construction has required an even greater number of skilled designers, engineers and mechanics.

After the plane is completely constructed it is rolled onto the flying field, where line mechanics begin an engine run-in and tuning-up. The test pilot next takes the plane into the air for its trial flight. After the first, there will be slight adjustments of controls, followed by four to ten hours of routine flying to "shake down" the completed article, insuring its satisfactory performance.

Special gasoline and lubricating oil must be placed aboard. These have been prepared for the air industry after a long series of tests, as automobile products are not satisfactory for the airplane engine; thus an allied industry is brought early into the picture.

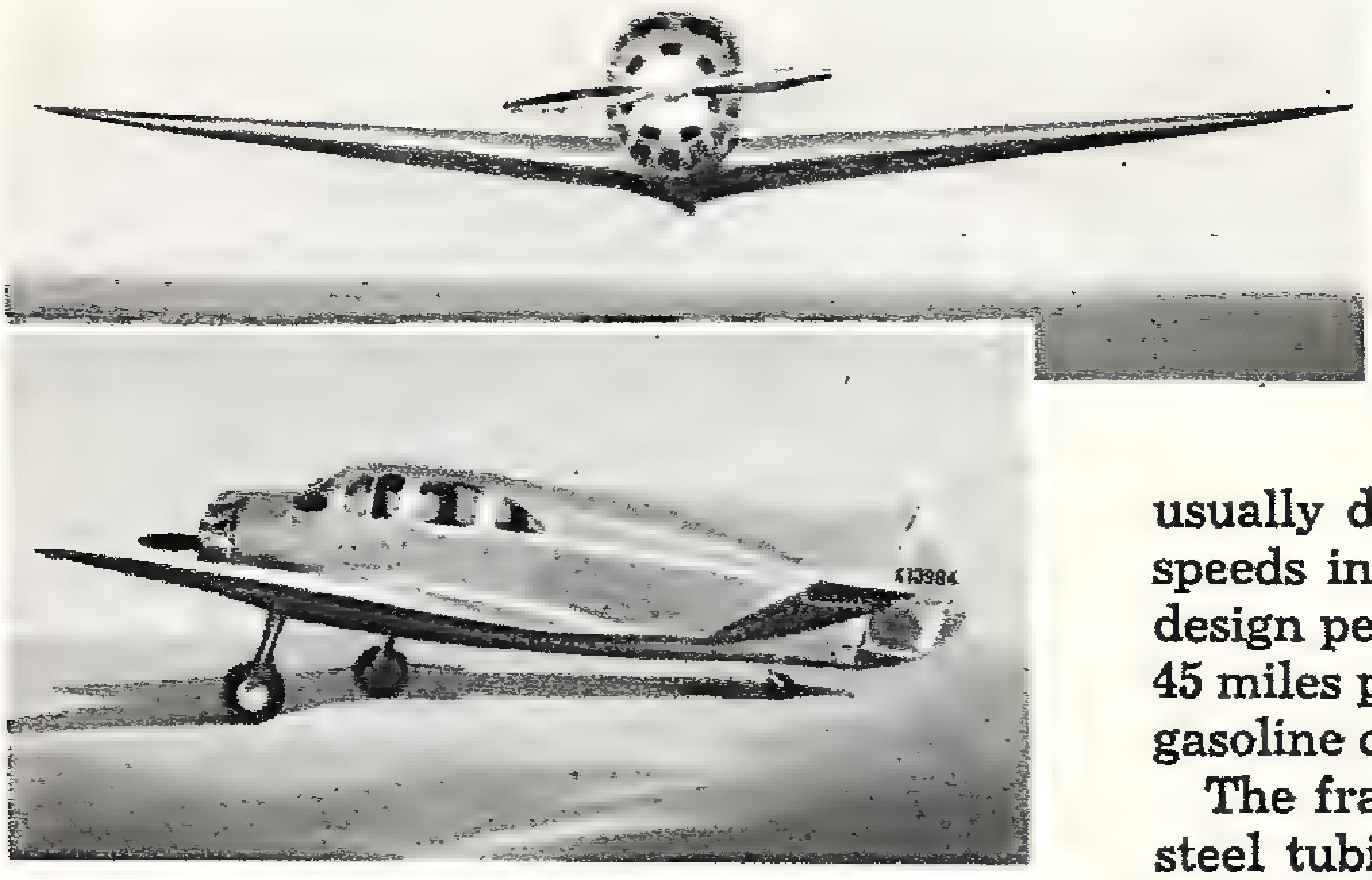
The plane is located in a flying field especially prepared as a home and landing site for aircraft. This complete installation, with its hangars, runways, shops, operation buildings, and waiting-rooms probably cost more than two million dollars, required a year to build, and made work for several hundred men of many trades, running through the gamut of the building industry.

Before the plane takes off, the pilot will receive complete weather reports gleaned over radio and wire all along his proposed course. These will be interpreted and prepared in final form by skilled meteorologists.

The pilot tunes in his radio for contact with the ground organizations along the airway he is to fly. His course is not marked by

[*Continued on page* 133]

New Aluminum Plane Claimed Cleanest In Design



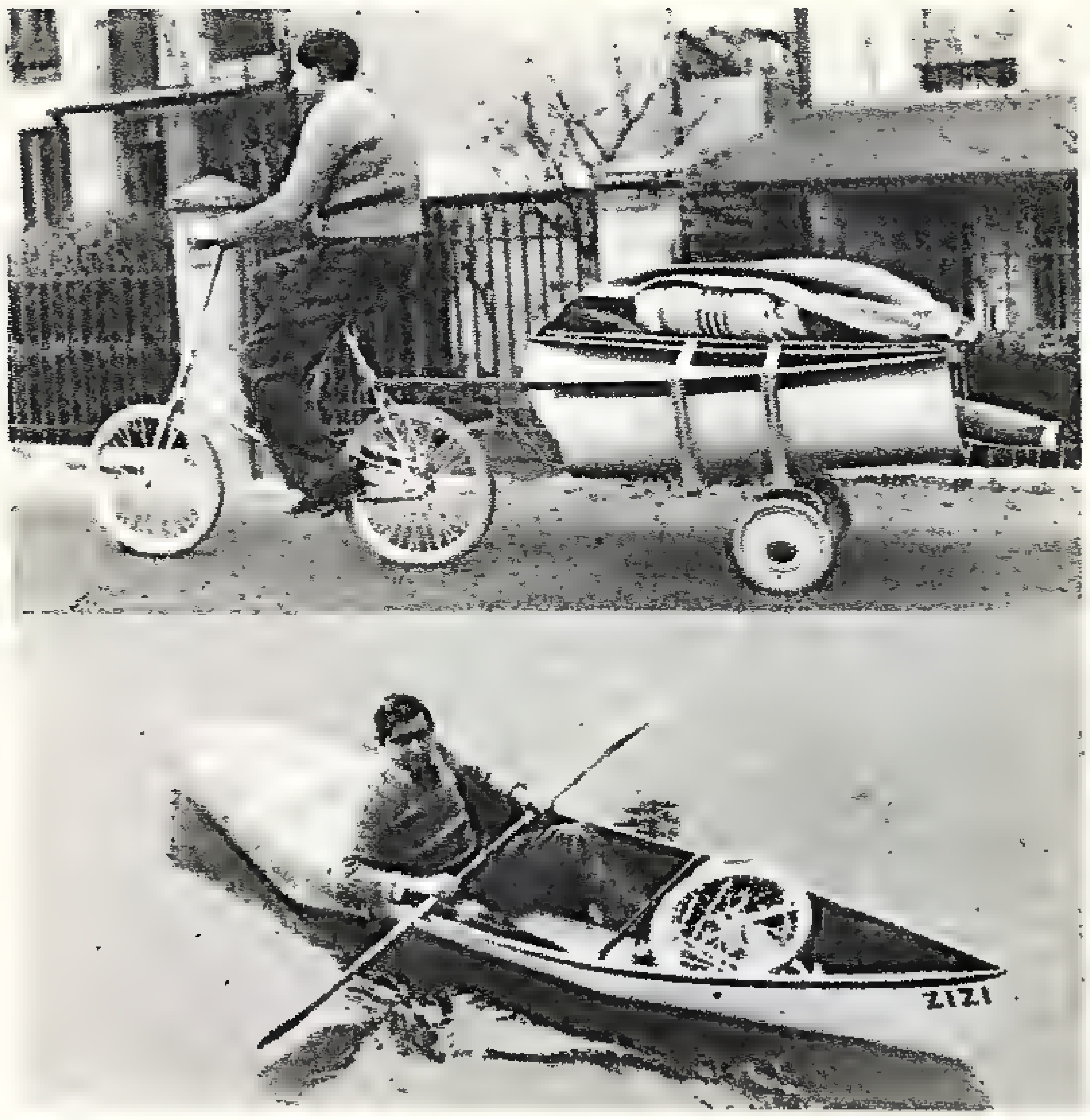
Capable of speeds exceeding 160 m.p.h., this new aluminum and steel monoplane is claimed to be the "cleanest" in design of modern aircraft. Plane is powered by a 17 cylinder engine.

CONSTRUCTED of Alclad, an aluminum alloy, and powered by a 285-horsepower Jacobs engine a new monoplane recently tested at Tulsa, Oklahoma, is claimed by its builders to be the cleanest in design of any plane yet to be constructed. Featuring a raked rudder post and an unusually deep fin area the plane is capable of speeds in excess of 160 miles per hour. The design permits the plane to land at a speed of 45 miles per hour in perfect safety. Sufficient gasoline can be carried for flights of 800 miles.

The framework of the ship is of reinforced steel tubing covered with sheets of the thin, but durable, Alclad metal. Special insulation materials are employed to keep all motor noise from the cabin during flight.

Canoe, Bicycle Fold for Traveling

AFTER constructing what might well be called a vestpocket bicycle the French inventor, Louvet, realized that a craft for water travel, featuring the collapsible feature of the bicycle, was also needed. After several weeks of planning and building Mr. Louvet emerged from his workshop with a truly folding canoe. The odd craft consisted of three sections easily assembled with only ten screws. A rubber lining prevents the boat from sinking once it is in the water.



After designing a collapsible bicycle for land travel, French inventor, Louvet, shown above, set to work on a folding craft for water travel. A small trailer hauls folded canoe overland.

Chef Fashions Caricatures In Toast

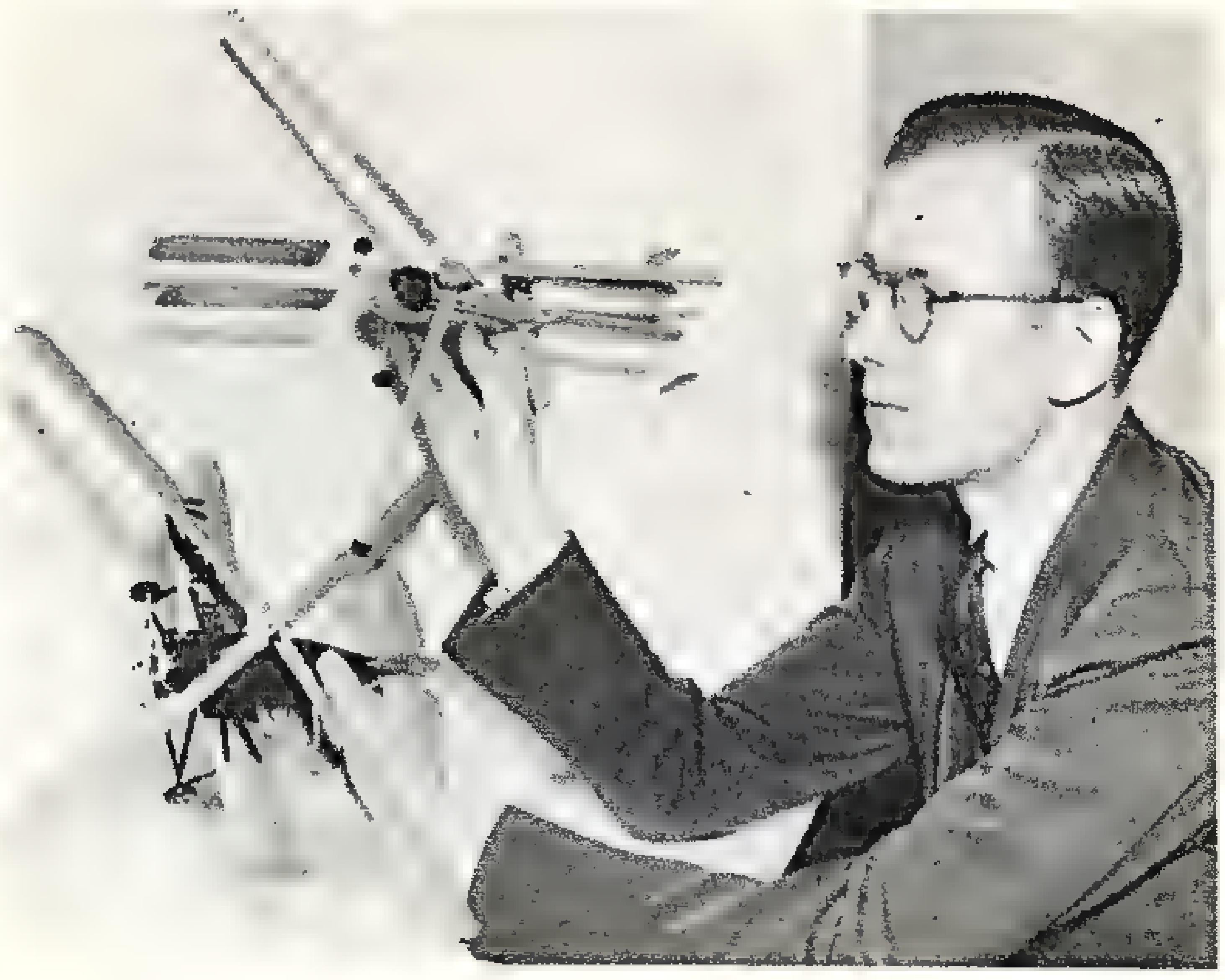
These novel caricatures have been fashioned from toasted bread. Louis Strakes, New York chef, is shown applying finishing touches to a group representing notables in politics.

FEW people would find an ambition for developing art talent in toast yet Louis Strakes, a New York restaurant chef, has developed striking cariactures from this common breakfast item. Using people prominent in the world news Mr. Strakes begins the caricatures by browning slices of bread to various shades. The bread is then cut into small pieces and assembled to form the character to be depicted. When the figure has been completed it is mounted on a base consisting of four pieces of toasted bread. Toothpicks are used to hold the caricatures together. In a few months Mr. Strakes has become world famous for his unusual craft.

GIRO PLANE FLIES Without PROPELLER

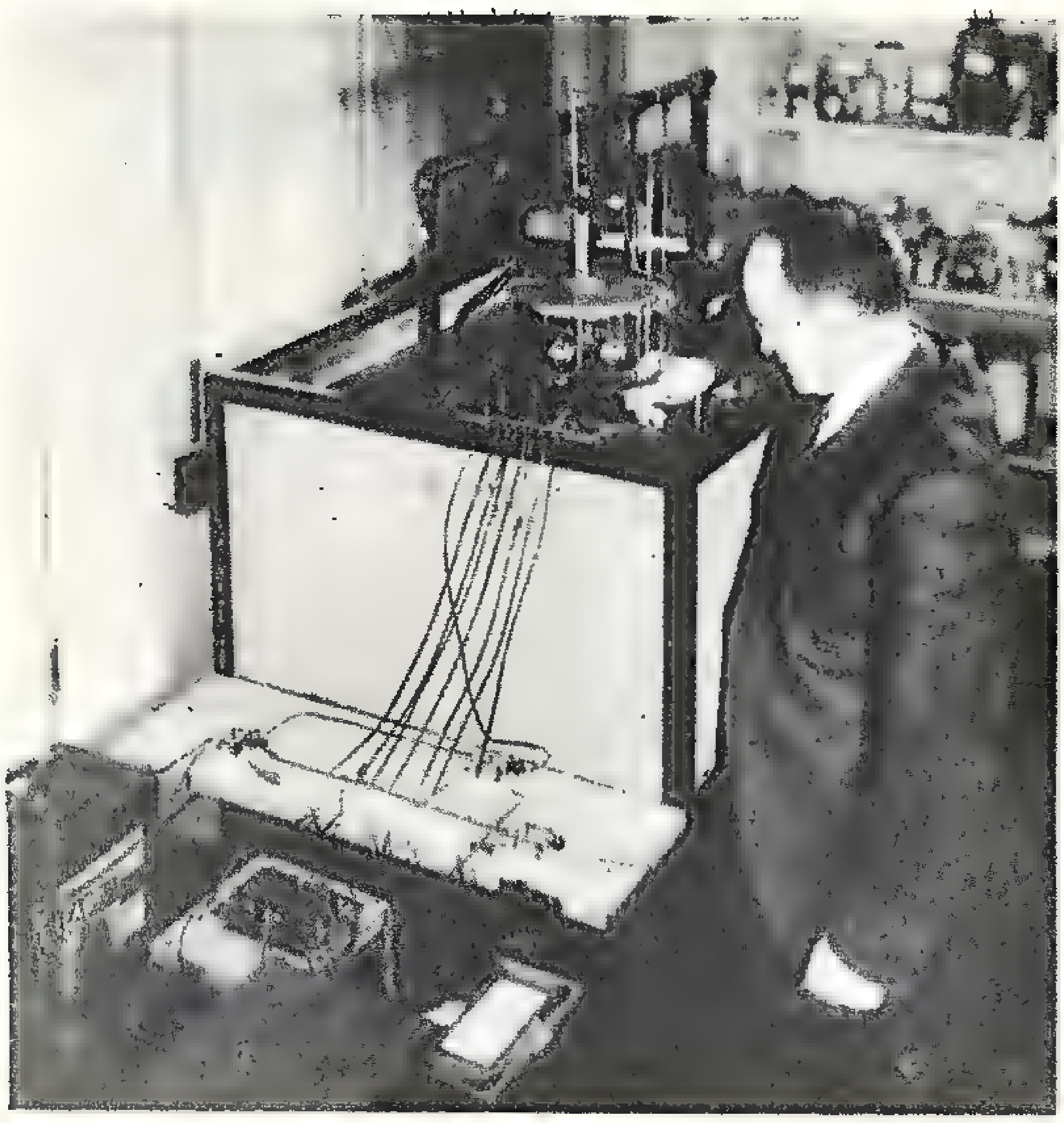
AN AUTOGIRO plane which is expected to fly without the aid of a propeller has been designed by W. Laurence Le Page, a Philadelphia consulting engineer. The odd craft has been constructed in model form. It is wingless. Tests in the wind tunnels of New York University have been satisfactory.

In Mr. Le Page's plane there is no vertical propeller. The rotor supplies both the lift and forward motion. In order that the craft will fly in a true course parallel vanes are located both forward and back of the fuselage. Steering is accomplished by means of special rudders extending from the rear fins.



W. Laurence Le Page, inventor of the revolutionary autogiro, is shown with models of the original and his improved craft. Mr. Le Page is holding his plane above model of earlier type.

Device Measures Body Heat of Bees



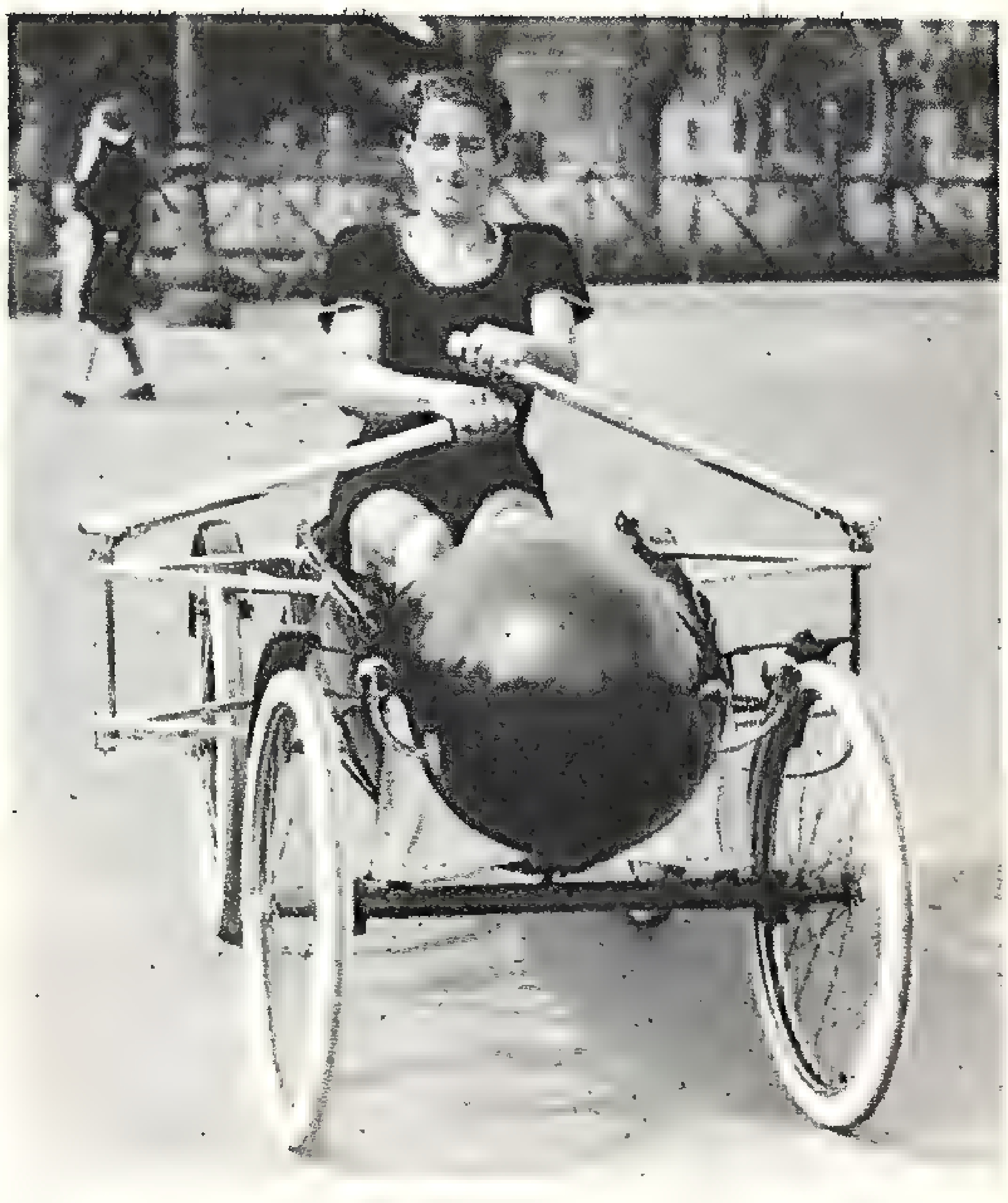
Standing before his thermo electric apparatus at Brown University, Professor Ivan R. Taylor, of the faculty, points out instruments used in recording body heat of various insects.

AN INSTRUMENT so sensitive that it will record the body heat of bee moths has been perfected by Ivan R. Taylor of the Biology Department at Brown University. Operating on the thermo electric principle the apparatus permits the University scientists to make a careful study of the changes that take place when the insect changes into a moth.

Prof. Taylor and his associates have learned that it would take four bee mothpupae seven and one-half days to produce enough body heat to raise the temperature of a thimble of water from freezing to the point of boiling. This is the first time instruments have been used to explain the phenomena.

Athlete Invents Novel Land Canoe

OPERATED by oars and capable of speeds of 30 miles per hour, a novel land canoe has been invented by Umberto Bozzoli, an Italian athlete, for keeping in trim. Effort applied to the oars is transmitted to a special gear arrangement which drives the rear wheels of the vehicle. Steering is accomplished by pedals located in the floor of the device so that rowing is not interrupted.



Bringing the features of scull racing to dry land is made possible with this land canoe, the invention of an Italian. Vehicle is propelled by oars which actuate a gear mechanism.

The DAREDEVIL DUB—

The speed maniac is poison to veteran race pilots, for he is the driver who has no regard for his own life or the lives of others. His misguided daring is exposed in these pages.

by FRED GILMAN JOPP

Above—The start of the annual Automobile Race Classic at the Indianapolis Speedway. This famous brick saucer has long been the thrill crucible in which motor cars are tested and is the track responsible for breeding the mechanically-perfect, beautifully-appointed car that you drive today.

On the dirt tracks, those high-banked as shown in the above illustration, the usual skid brings the spinning car down exactly as if it were a marble twirling around a saucer. As a consequence, a pilot is seldom injured when "weaving the apron." It is the outside spin that worries him, for centrifugal force is pushing him outward. When this latter spin occurs on a banked curve, over he goes in a terrific impact which may mean death.

INDIANAPOLIS!

Stands and infield are packed with high-tension humanity. Everywhere is the multi-colored hue of race day. The aroma of crankcase oil is in the air, with all eyes glued to the gigantic brick saucer, where the steel whippets are receiving their final tuning.

"Look!" shouts someone. "There is Kelly Petillo. If the jinx doesn't ride with him, he'll win again this year."

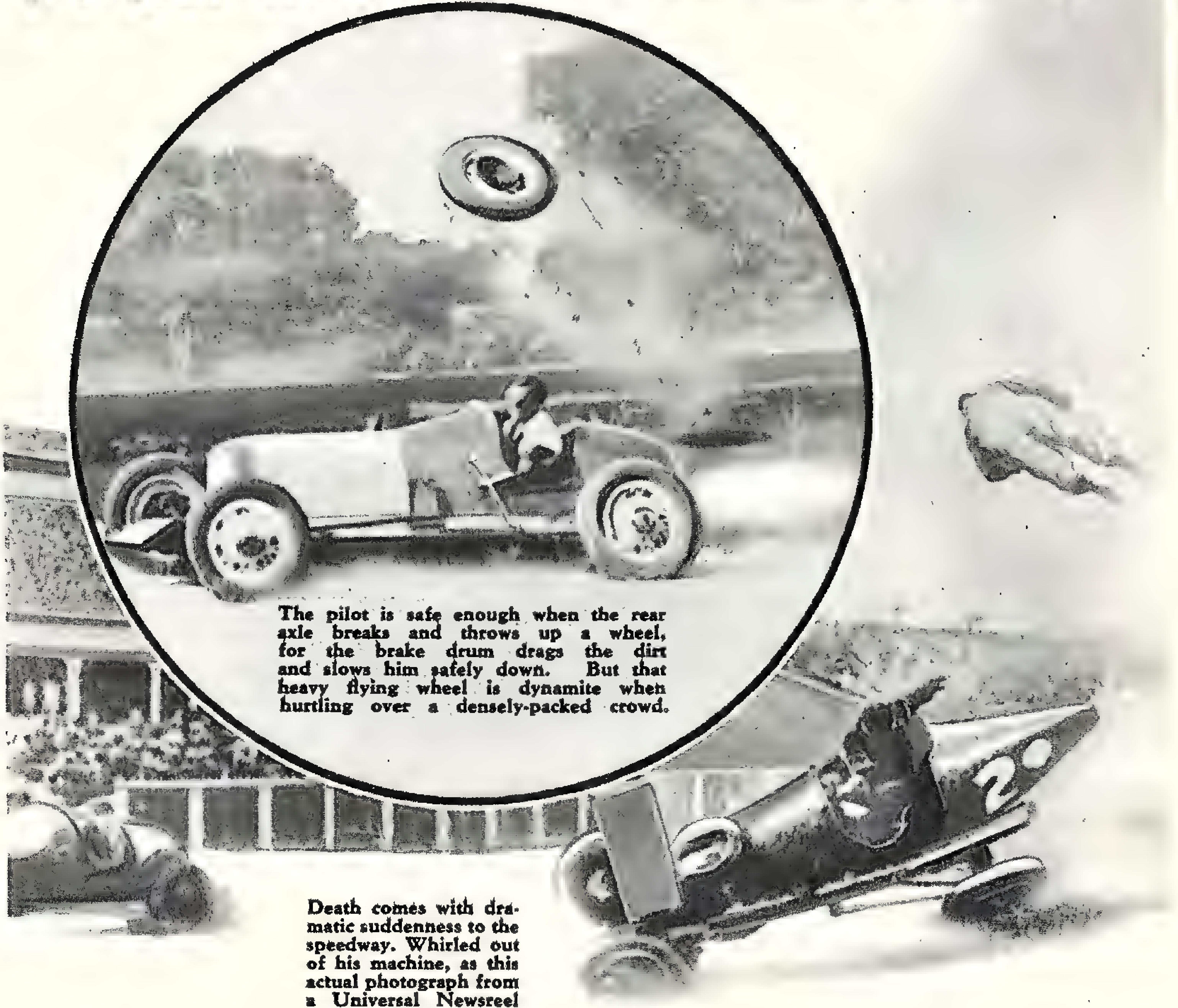
"And there is 'Wild Bill' Cummings over there," says his companion. "Boy, does he roll a fast bus?"

The cars are pushed into starting position, and telegraph keys and press typewriters leap into high and begin their feverish "tick-tack" to a waiting world.

The referee dispenses eloquent caution, then drops his flag. The swarm of motored projectiles shoot forward.

Despite your protracted anticipation,

MENACE of AUTO RACING



The pilot is safe enough when the rear axle breaks and throws up a wheel, for the brake drum drags the dirt and slows him safely down. But that heavy flying wheel is dynamite when hurtling over a densely-packed crowd.

Death comes with dramatic suddenness to the speedway. Whirled out of his machine, as this actual photograph from a Universal Newsreel shows, this pilot fell to the track in front of his still-rolling car, and it crushed out his life.

the start is unexpected. A blast of violent, all-swallowing noise from engines suddenly accelerated smites your ears with a pang of sharply-enhanced apprehension. The roar from unleashed cylinders swells and broadens, then temporarily breaks as the pilots lift heavy feet to ease their mounts into the turn. They circle the track and enter the straightaway in perfect start formation. Again the referee snaps his flag downward, this time with an authoritative jerk, and they are off—to a flying start!

There's Kelly Petillo, Floyd Roberts, Doc MacKenzie and Chet Miller out front, already for these boys qualified for the Champion 100-mile-An-Hour Club by averaging better than "100 miles per" for the entire distance last Decoration Day. And only fourteen others have had the driving stamina and racing luck to win the Indianapolis Race since it was inaugurated a quarter century ago.

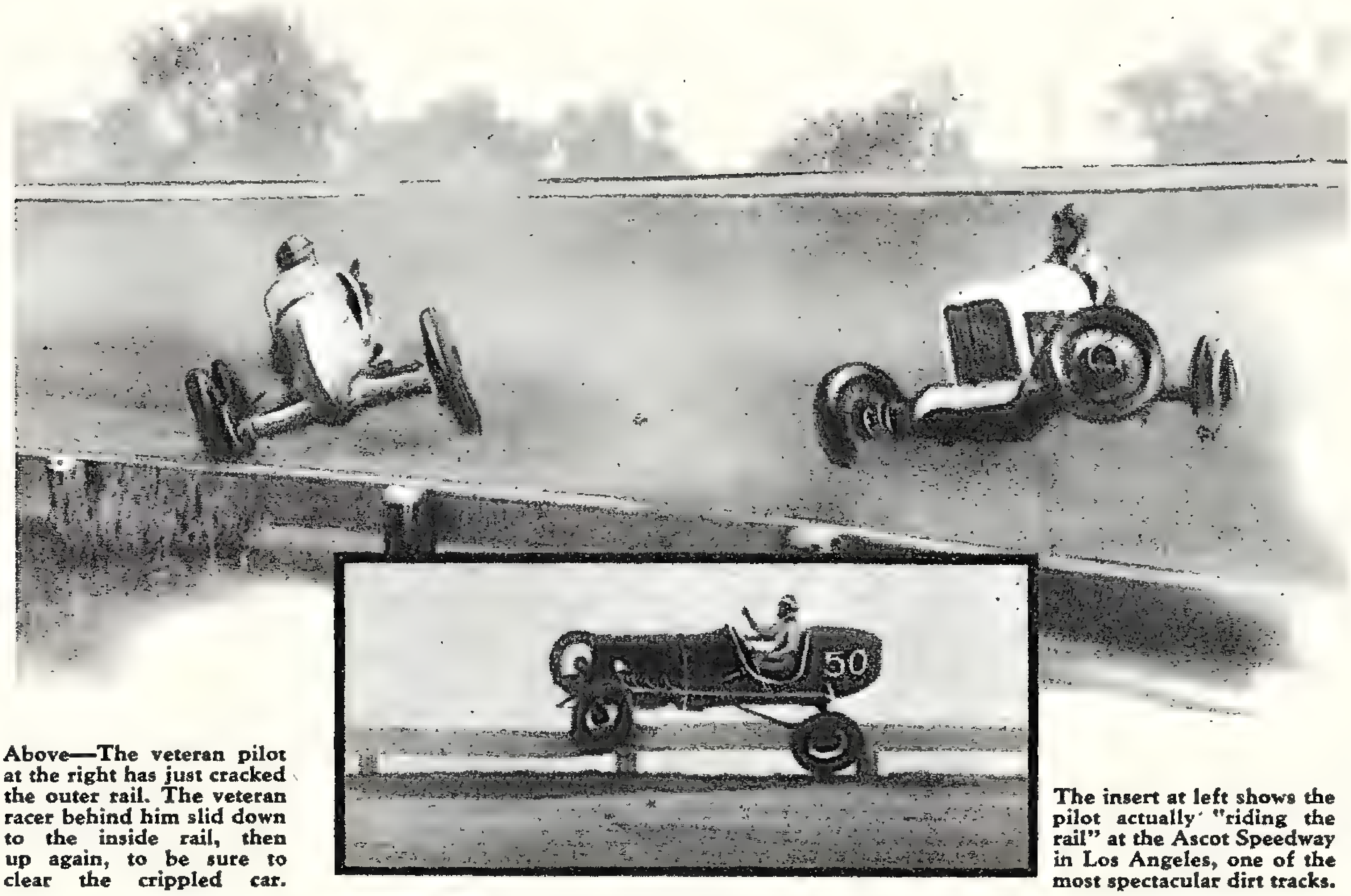
Lap after $100 lap the pilots flirt and kid with death, the slipstream flattening them back, ears splitting from the howl of wide-open throttles, and always with eyes front that the curves may not gravity-slap them into the retaining wall.

Lap after lap . . . and look! That skidding car! Those in the stands are out of their seats in a flash, for . . . CRASH!—a tangle of shattered men and cars. It's happened! It was bound to happen. But why?

Down in the repair pits the attendants don't ask why. They know—know that a mechanical break in tight quarters shot a veteran pilot out of control, or that a "dub" pilot messed up the race.

The "dub" pilot seldom will be found in

RIDING THE RAIL IS RACING'S SUPREME THRILL



Above—The veteran pilot at the right has just cracked the outer rail. The veteran racer behind him slid down to the inside rail, then up again, to be sure to clear the crippled car.

The insert at left shows the pilot actually "riding the rail" at the Ascot Speedway in Los Angeles, one of the most spectacular dirt tracks.

the great automobile classic, the 500-mile Indianapolis Speed Contest. He is usually eliminated in the qualification trials. For the "dub" is born, not made. He works his way up the racing ladder from the county fair circuits and professional dirt tracks. AAA officials do everything they can to eliminate him, but no set of judges are infallible, and no group of men, no matter how capable, can determine just what a pilot will do in a dread emergency. They judge his past performances, watch him carefully in the speed trials—and hope for the best.

For the dub looks like any other pilot on the surface. But inside he is a fatalist, and when it comes his turn to be kissed by the icy lips of Death, he wants to be gripping the wheel of the fastest car in the world, his feet shoving the accelerator through the floorboards. He is certain of winning every race he enters. In fact, he always has the prize money spent even before the race starts. But there is no telling just what he will do when Death hovers over the track, because he has an utter disregard for his own life, and the lives of others.

One in particular will give you a good idea why veteran pilots call him "dub." We won't mention his name, but he certainly was a driving fool. He had raced on many dirt tracks and—had never won a race. One morning he was showing off speed in practice to a visiting movie star, and he "cracked the rail." When told he had but a few moments to live, he raised himself on his elbow and summoning all the breath left in his broken body exclaimed with a conviction as impressive as it was pitiful, "Tell them the world's greatest race pilot is dead." And he was gone. The movie star, who aspired to become a pilot himself, was cured then and there. And now to illustrate how the "dub" works on the track.

Statistics prove that the veteran pilot who has gone through twenty races unhurt, has passed the favorable balance. Then, at any time, his "rubber tired dice" may throw a losing "seven." But it is seldom he is seriously injured.

The "dice" went against a veteran pilot one day. The steering knuckle of his car had let go and dumped him out on the track—unconscious. Those veteran pilots coming up behind had acted automatically in the emergency and allowed their cars a quick drift and skid up towards the rail to avoid the sprawled out body, but had straightened out

[*Continued on page* 144]

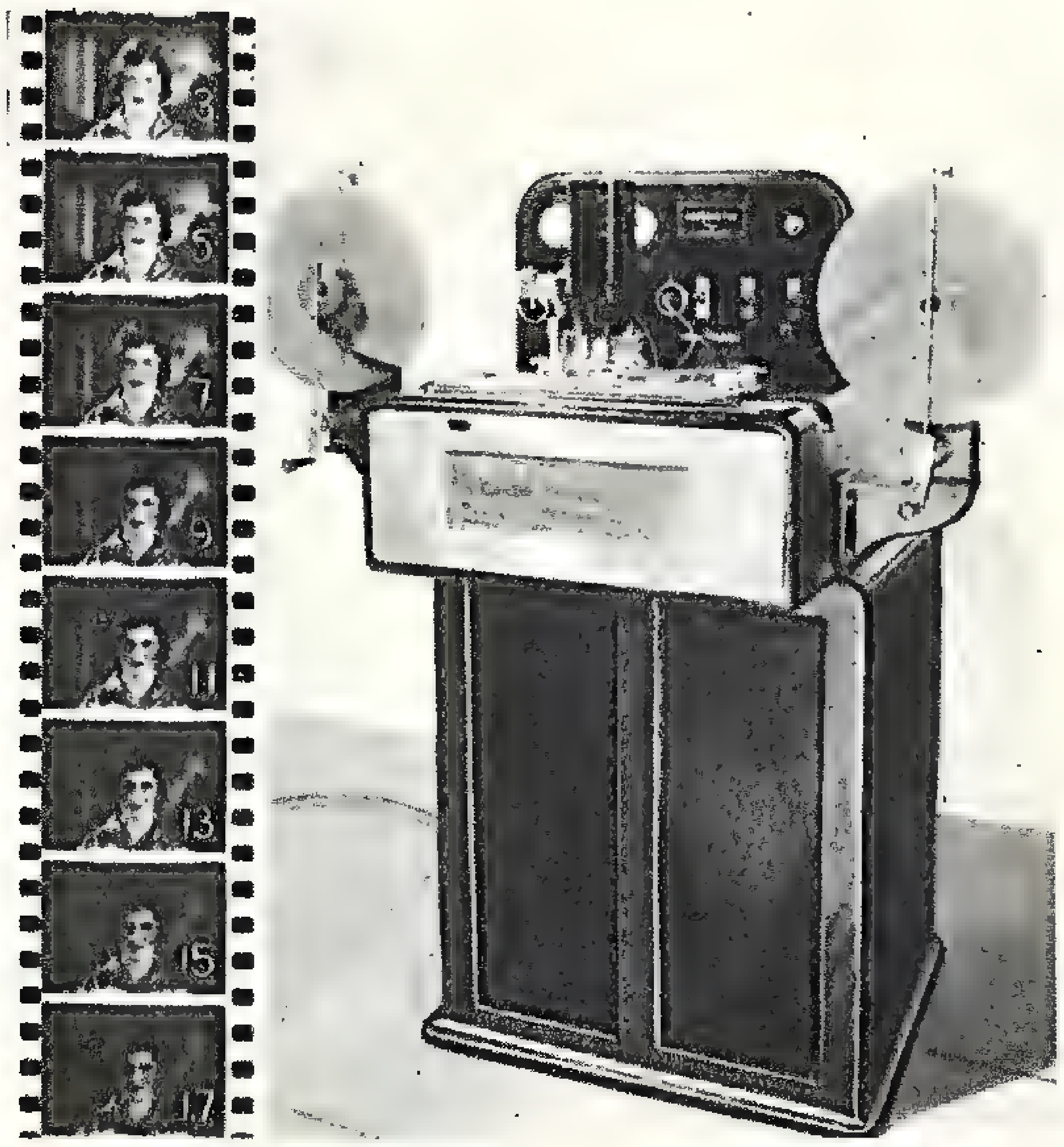
Light Beams Carry Voice; Instrument Boon to Aviation

CONVERSATION between airport dispatchers and pilots, who are about to land, can now be carried on without the use of the usual short wave equipment. The new apparatus transmits the voice over a light beam which is aimed at the plane. A special photo cell receiver picks up the pulsating light emitted by the light transmitter on the ground and converts it into sound.

The light transmitter, the invention of A. A. Arnhym and R. L. Longini, Chicago electrical experimenters, is claimed to be simpler in both construction and operation than the instruments now used for handling airport traffic.

Conversation between pilot and ground crew may be carried on over this light beam transmitter, invention of two Chicago experimenters. Electric eyes form the heart of instrument.

Robot Develops Film Uniformly



Movie film which varies in density, as with the film shown on the left, may be uniformly developed through the use of the Densometer shown. Photo cells insure proper developing.

DESIGNED for use in motion picture developing laboratories a new machine permits uniform developing through the use of an electric eye densometer. In the past expert photographers were required to watch the film during processing in order that all portions of the film would be uniform in density. Due to eye fatigue even the most skilled film technician would commit many errors in processing a picture. The Densometer eliminates all errors and is also five times as fast as a human in doing the work.

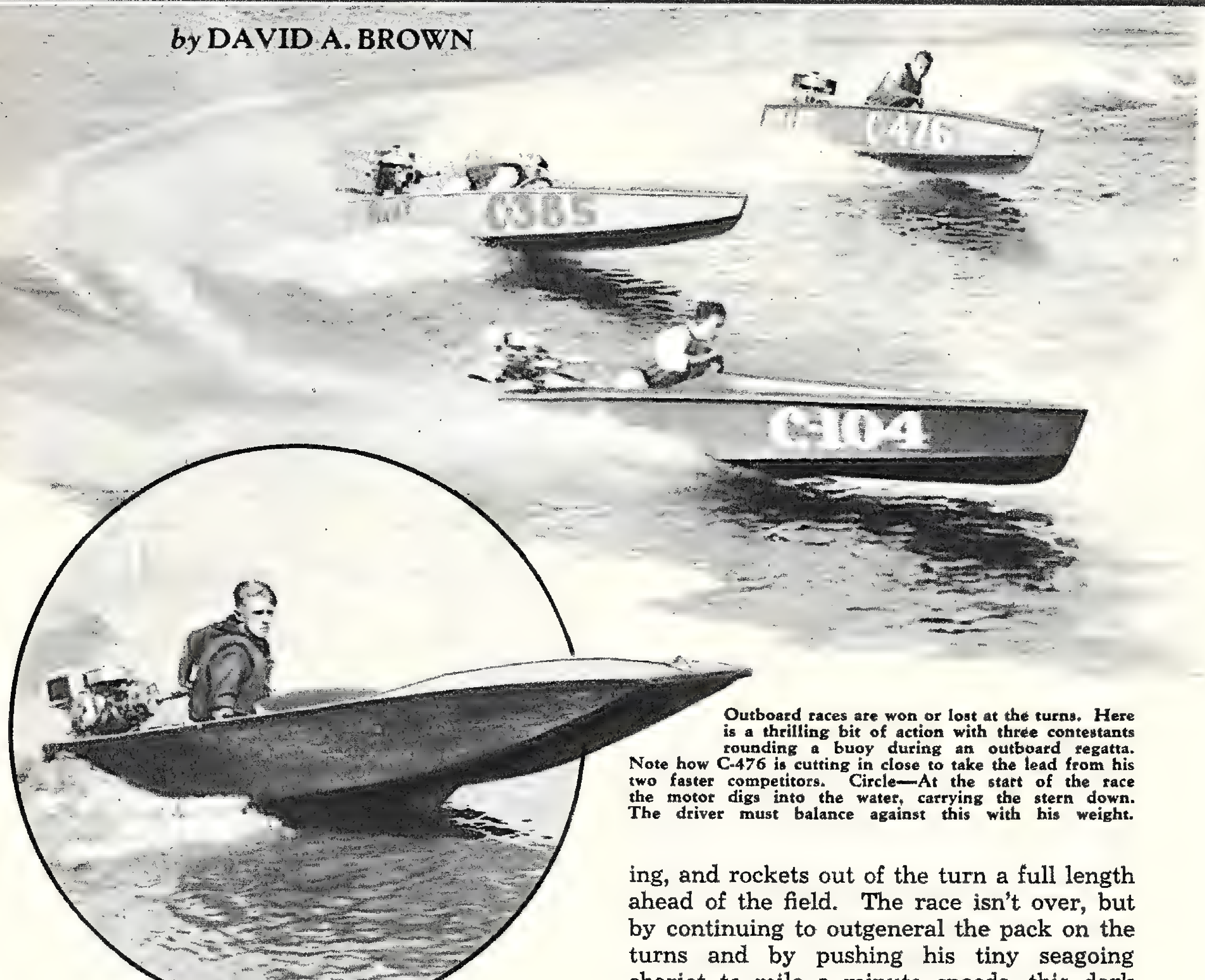
Radio Listens In On Phone Calls

AN ELECTRICAL eavesdropper, the invention of a Washington, D. C., man, Samuel S. Hixon, permits the listening in on phone conversations without connecting to the line. The device, operating on the radio principle, is capable of picking up conversation from phone wires within a radius of twenty-five feet without tapping lines.

Samuel S. Hixon, Washington, D. C. inventor, points out the interesting features of his telephone eavesdropper. The unusual radio receiving apparatus permits picking up telephone conversation without making any line taps.

SPLITTING the WAVES with the

by DAVID A. BROWN



Outboard races are won or lost at the turns. Here is a thrilling bit of action with three contestants rounding a buoy during an outboard regatta. Note how C-476 is cutting in close to take the lead from his two faster competitors. Circle—At the start of the race the motor digs into the water, carrying the stern down. The driver must balance against this with his weight.

A DOZEN outboard racing boats drive wide open toward the starting line as the hollow boom of a gun rolls out over the river. They get away in a straight line, but as they roar down the stretch three boats pull away and go into the turn fighting for the advantage, their sterns awash in a shower of spray and their bullet noses bobbing like flat stones skipping over the water.

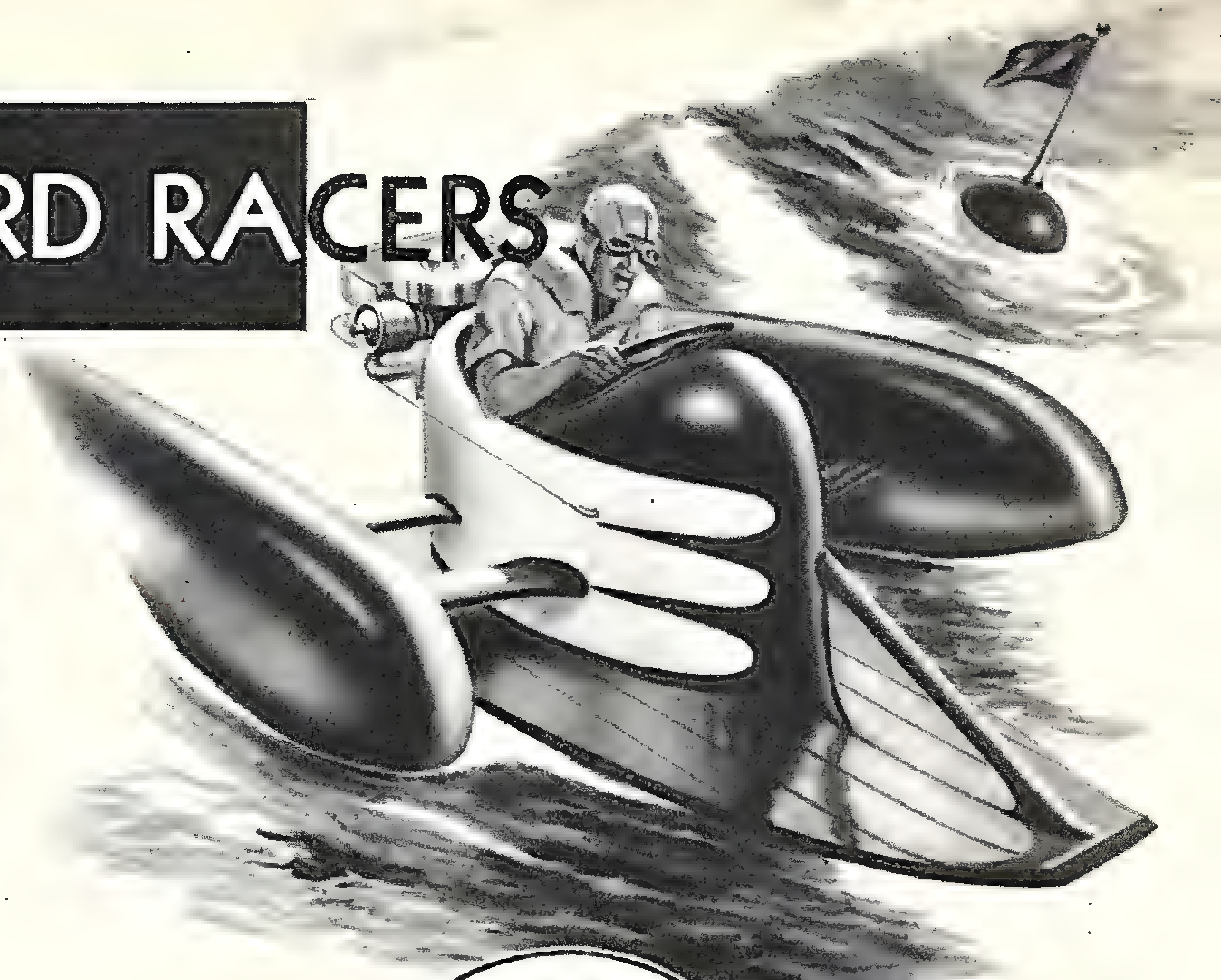
They are rounding the buoy in a bunch when, suddenly, the outside boat, its driver leaning far out over the gunwale to keep it from leaping out of the water, cuts in sharply, drives miraculously through a narrow opening, and rockets out of the turn a full length ahead of the field. The race isn't over, but by continuing to outgeneral the pack on the turns and by pushing his tiny seagoing chariot to mile a minute speeds, this dark horse pilot is able to cling to his advantage and to race home a winner.

There are few dull moments in any outboard race, but there is little doubt that the greatest thrills come when a field of daredevil drivers race their boats into a breathtaking turn in their efforts to gain a slight lead. It is agreed, too, by the men who drive these roaring river-comets that most races are decided at the turning buoys.

The tendency among boat designers today is toward shorter and wider boats with little or no freeboard. In fact, most of the boats used are designed with sloping decks which meet the hull. One of the most radical of this latter type is shown on the cover of this maga-

OUTBOARD RACERS

Aquatic sports reach their peak of excitement in outboard racing, when sizzling spray fills the air and skill rides the waves to triumph over speed. Each year the records go higher. This article tells why and how.



This radically new motorized surf board may easily establish a new world's record.

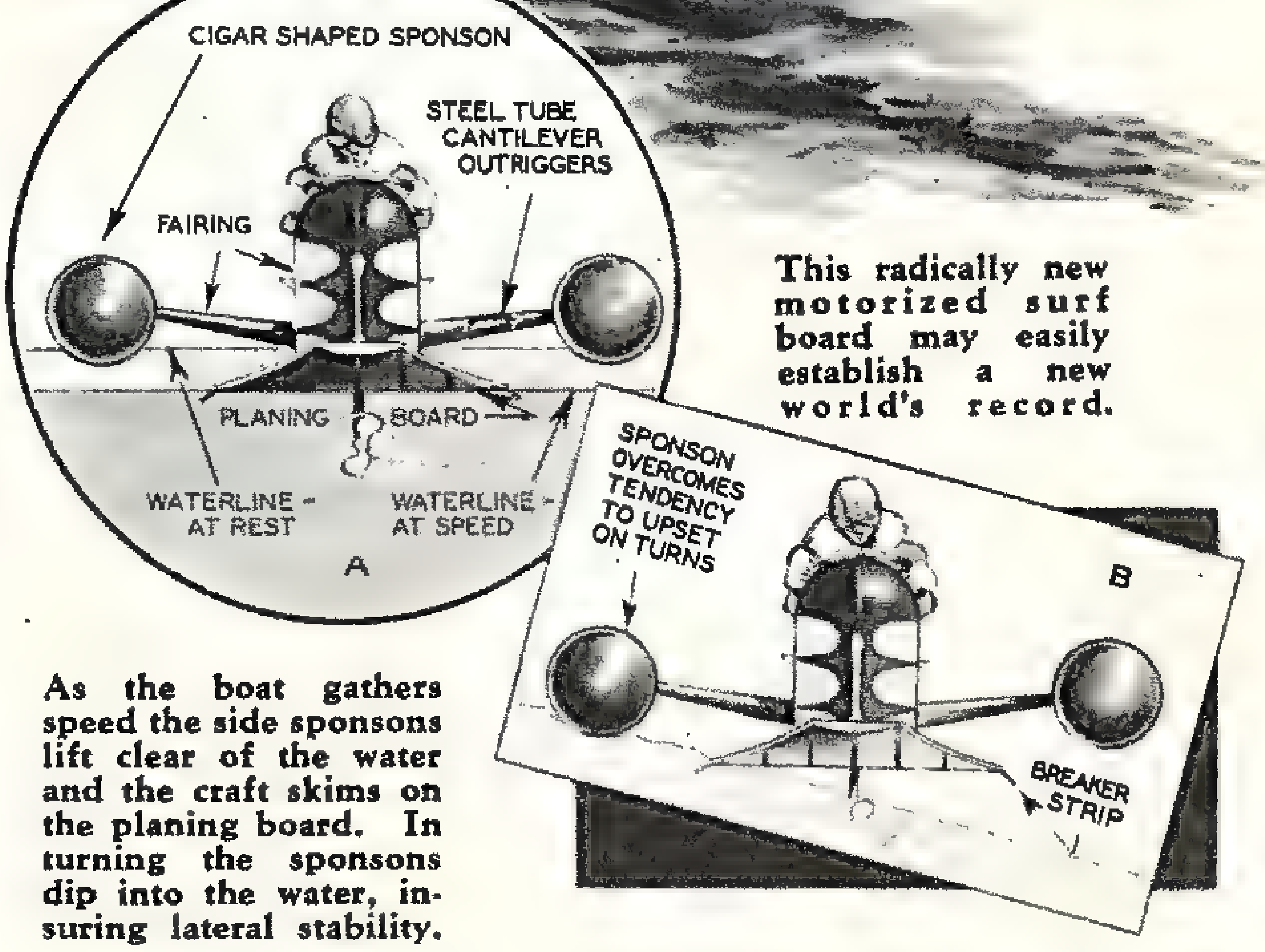
zine. Here the hull consists of nothing more than a surf board so designed that all buoyancy is provided by the planing action of the boat at high speeds. Two sponsons keep the craft afloat while gathering speed, and also serve to stabilize it on sharp turns.

Motors, too, have been greatly improved. Not long ago the speed record for outboard boats was but a little over 25 miles per hour, but today four-cylinder motors which will turn up 6,500 to 7,000 revolutions per minute are used in Class F and Class X, and the record has been pushed up to 69.383 miles per hour. In fact, even the midget racers—50-pound boats powered with motors of 7½ cubic inches piston displacement, with their tiny two-cylinder motors have done better than 33 miles per hour.

The beginner at the sport, then, must learn not only how to eliminate the hazards that exist on the turns, but how to make use of them to gain an advantage. Leading the field, a pilot should hug the buoy as he goes into the turn and swing around it as sharply as possible to block out his opponents. However, if a boat is prevented from taking the inside, the turn may be made so as to bring the boat about close to the buoy and inside of leading opponents as the swing is completed. Often a trailing boat may be maneuvered into the lead in this manner.

If a turn is made too sharply, however, excess cavitation—propeller churning up water without developing power—will cause a loss of speed which will more than off-set the saving in distance traveled. There is also the danger of wind catching the tilted bow and capsizing the boat in a close turn, as well as the possibility of a spill resulting when the outside gunwale dips and catches in the water as the boat slips away from the turn. These accidents may be prevented by moving forward in the cockpit and throwing the weight out across the gunwale on the inside of the turn until the buoy is rounded and the boat is straightened out for the return.

River currents also must be carefully gauged. If the motor is throttled down too soon when going into a turn, a strong, adverse current may carry a boat into the buoy and wreck it. There is, too, a danger of being carried far beyond a down stream marker if



As the boat gathers speed the side sponsons lift clear of the water and the craft skims on the planing board. In turning the sponsons dip into the water, insuring lateral stability.

STRATEGY Counts in OUTBOARD Racing

Here is a beautiful start in a spirited outboard race. The boats are off at top speed and are already jockeying for position. Note how drivers are balancing their bouncing crafts.

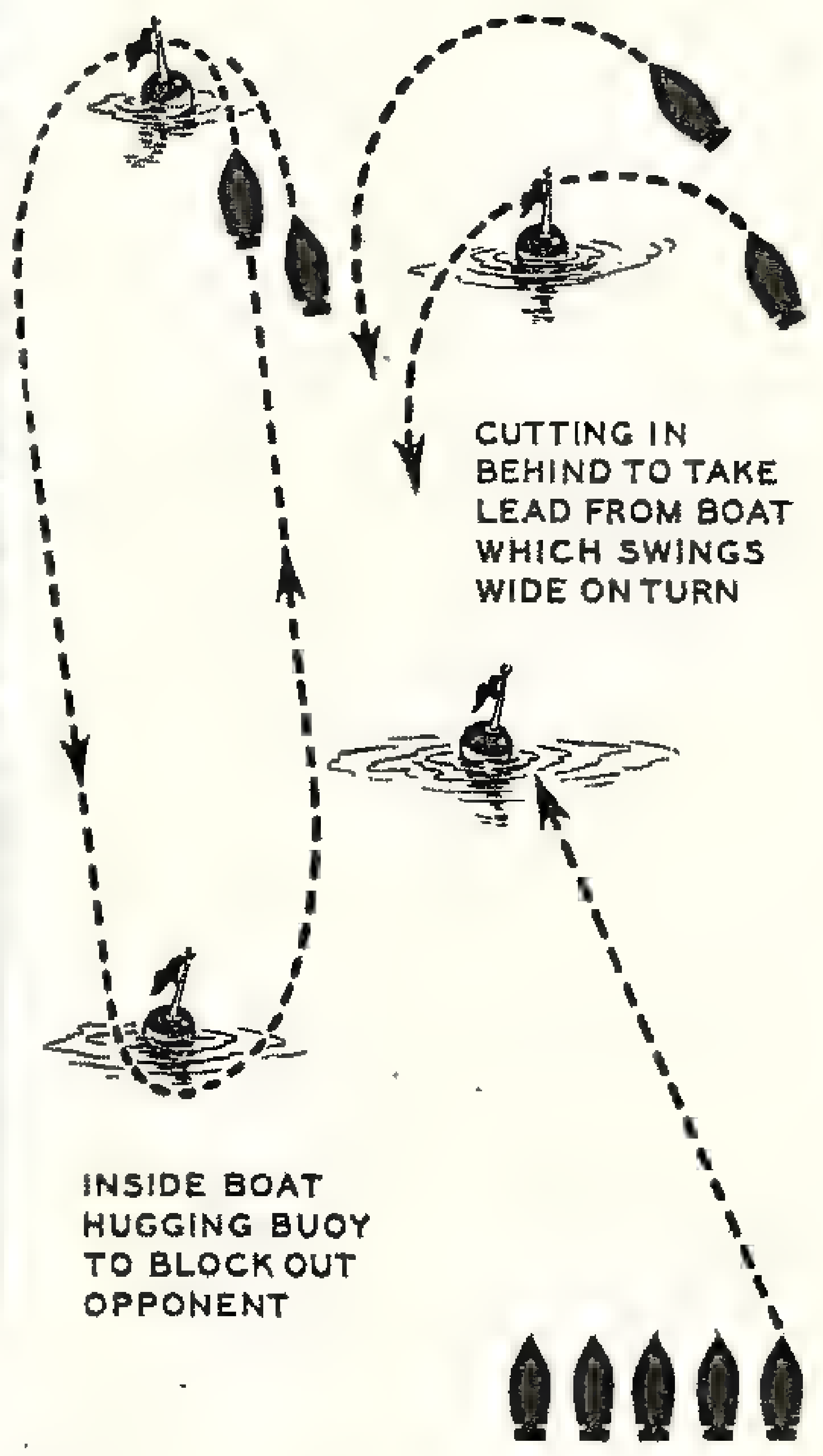
the motor isn't throttled down soon enough to allow for the drift of a fast current.

But there are many more tricks that the experienced hydroplane drivers employ. The majority of races are started by firing a gun one minute before the contestants may drive their boats across the line in a running start. At the same time the second hand of a huge clock is started. To gauge their speed so that they can hit the starting line wide open, many drivers time themselves with a stop watch in a fifteen-second run, back from the line. This is done before the race and the point at which the timed run is completed is marked by its relation to some object on shore. The driver then starts from this point when the clock registers fifteen seconds of the starting time, opening up his motor so as to hit the line as the clock hand completes its revolution.

These racing starts should be practiced until perfect timing is mastered, for the boat getting away first has a tremendous advantage. Jumping the clock is penalized by requiring the offending driver to turn and recross the line, but since anything may happen before the end of an outboard race, a penalized pilot should never drop out.

Never ride in the wake of another boat. The water will be found too rough for easy

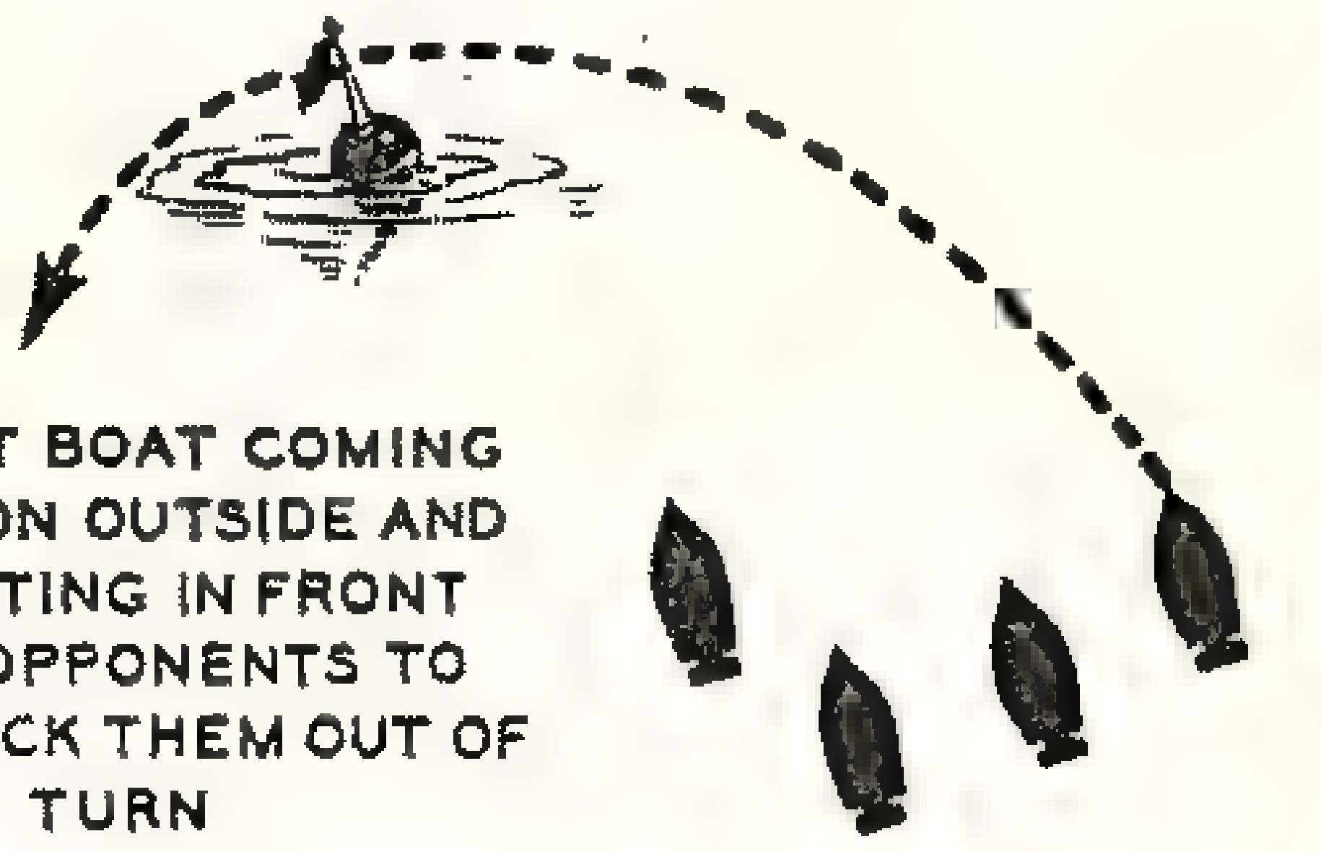
[*Continued on page* 128]



CUTTING IN BEHIND TO TAKE LEAD FROM BOAT WHICH SWINGS WIDE ON TURN

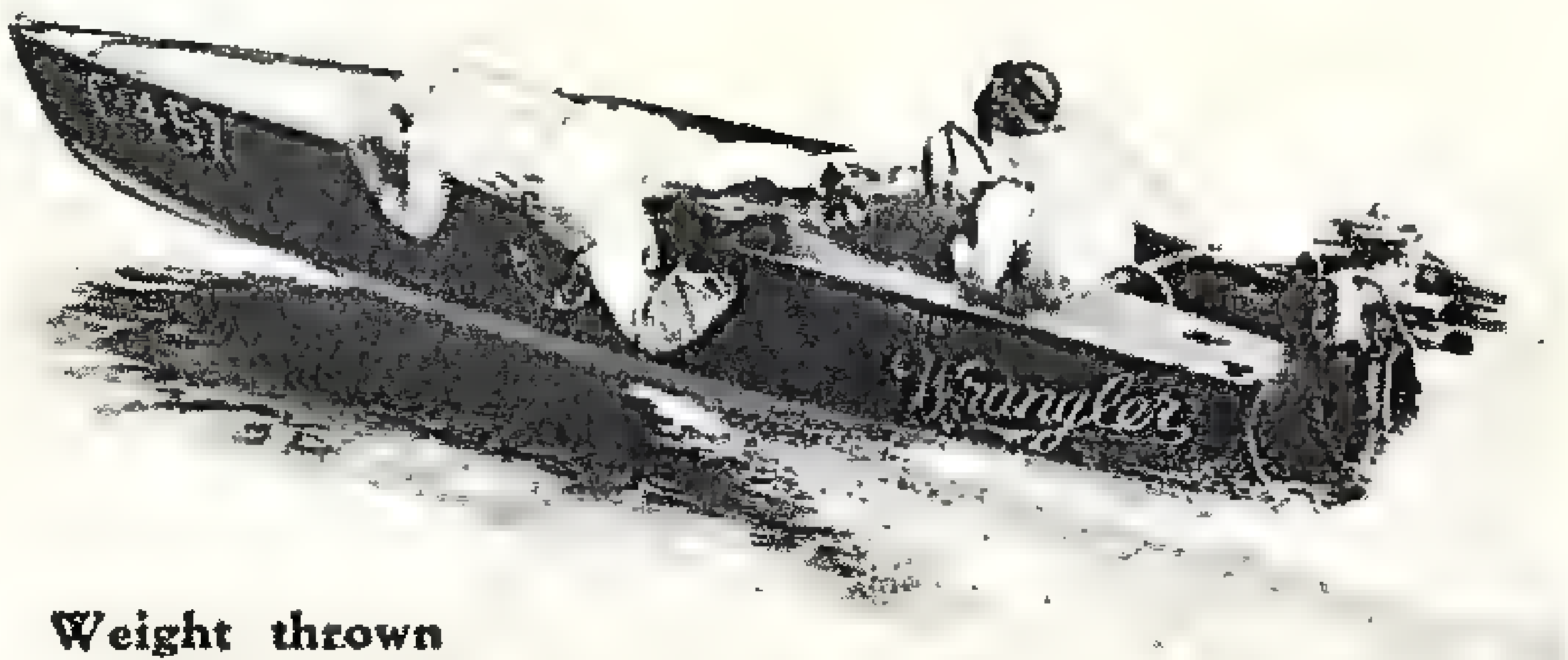
INSIDE BOAT HUGGING BUOY TO BLOCK OUT OPPONENT

OUTSIDE BOAT HEADS DIRECTLY FOR BUOY AT START TO CUT OUT OPPONENTS



FAST BOAT COMING UP ON OUTSIDE AND CUTTING IN FRONT OF OPPONENTS TO BLOCK THEM OUT OF THE TURN

Above are diagrammed some of the tactics employed by winning outboard strategists. Brains more often than not discount speed when it comes to winning races.



Weight thrown on inboard side is necessary on sharp turns.

OUTBOARD CLASSIFICATIONS

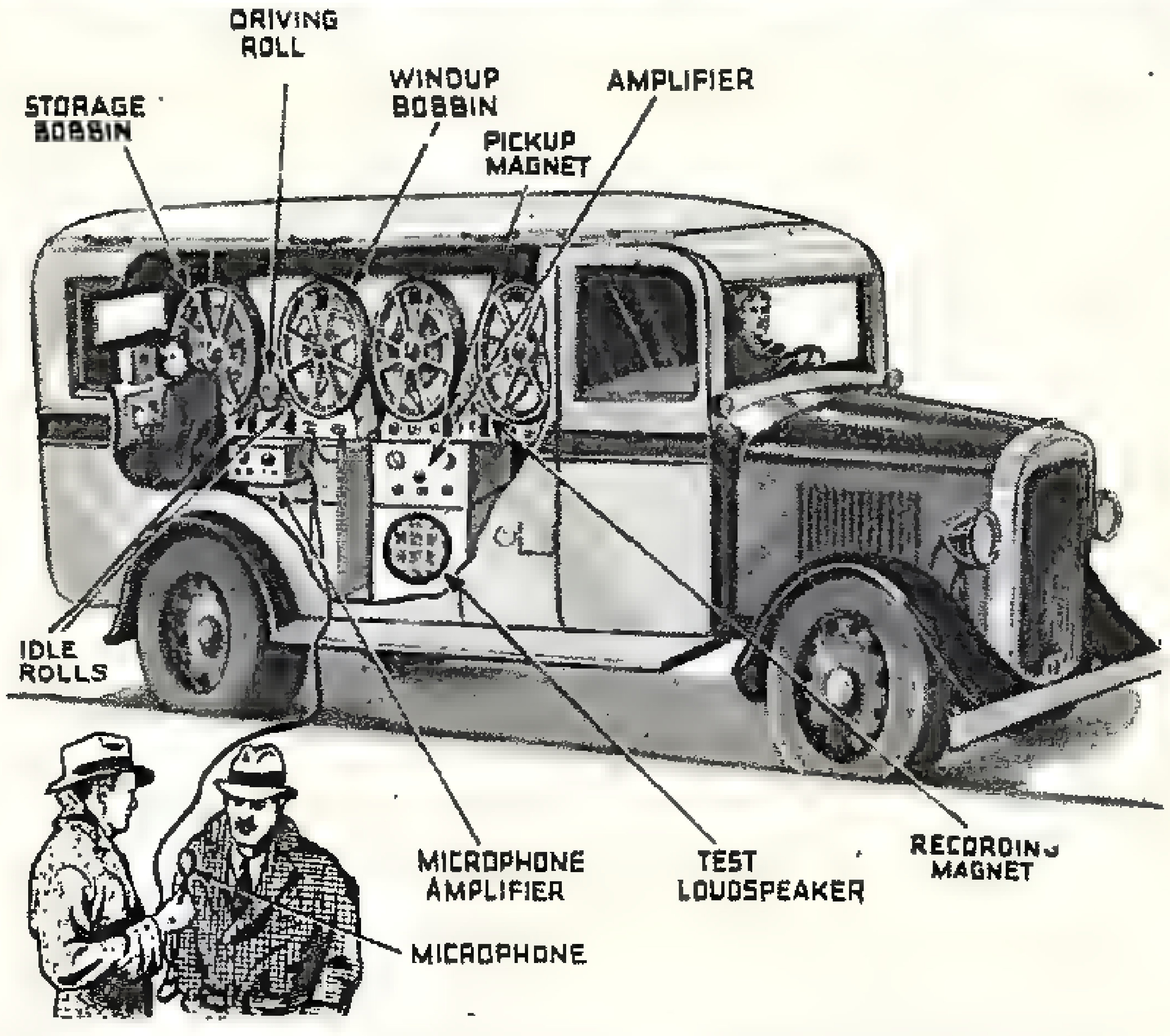
Class	Boat Weight	Maximum Piston Displacement of Motor
Midget	50 lbs. Minimum for boat and driver 150 lbs.	7½ cu. in.
A	100 lbs. Minimum for boat and driver 250 lbs.	14 cu. in.
B	100 lbs. Minimum for boat and driver 250 lbs.	20-30 cu. in.
C	150 lbs.	30-40 cu. in.
F	190 lbs.	50-60 cu. in.
X (International Class)	190 lbs.	61¼ cu. in. and up

Sound Truck Records Street Comments for Rebroadcasting

USING a specially designed sound truck, the German Broadcasting Company picks up the daily comments of various people interviewed on the street, records them on steel tape, and then rebroadcasts them in an evening program called "The Echo of the Day."

In addition to recording interviews on sundry topics, the truck also tunes in secretly on the talk of bystanders and often records remarks incident to fires and accidents. It carries enough steel recording tape to "can" a program lasting one and a half hours.

The recording is done by magnetic displacements of iron molecules through the use of an electromagnet controlled by the microphone current. Using a pickup magnet the recordings are transformed into electrical current fluctuations. These in turn pass through an amplifier and a loudspeaker and are converted into sound impulses. The same wire can be used again and again since another powerful magnet can be used to "wipe off" the previous recording or, in technical language, to bring the iron molecules back into their natural position.



Here is sound truck of German Broadcasting Company which is sent daily through the streets of Berlin recording comments and opinion of Everyman. These are rebroadcast later in day.

Big Tank Floated To New Location

This new tank with a capacity of 330,000 tons was literally floated to a new site. Engineers erected an earthen dyke, filled it with water then towed the tank to its destination.

FACED with the necessity for moving a 330,000-gallon tank to a new site in a short time, engineers of a Canadian oil company decided to take it by the water route. They built hard-packed earthen walls high enough to dyke a canal for the giant tank. The dyke was then filled three-quarters full of water and the empty tank was floated quickly and safely to its new location. Ordinarily, such a job would have required three weeks.

Eye-Glasses Double for Microscope

EYE-GLASSES which can be used instead of a microscope have been invented by C. Dreisseg of Hamburg, Germany. The glasses obtain their microscopic power from specially treated dark paper. This paper changed the focus of the eye so as to magnify the size of a fixed object. Even minute particles can be distinguished. The dark paper is encased in a leather band which fits snugly around the eyes to exclude all possible light rays. The novel glasses are ideal for student use.

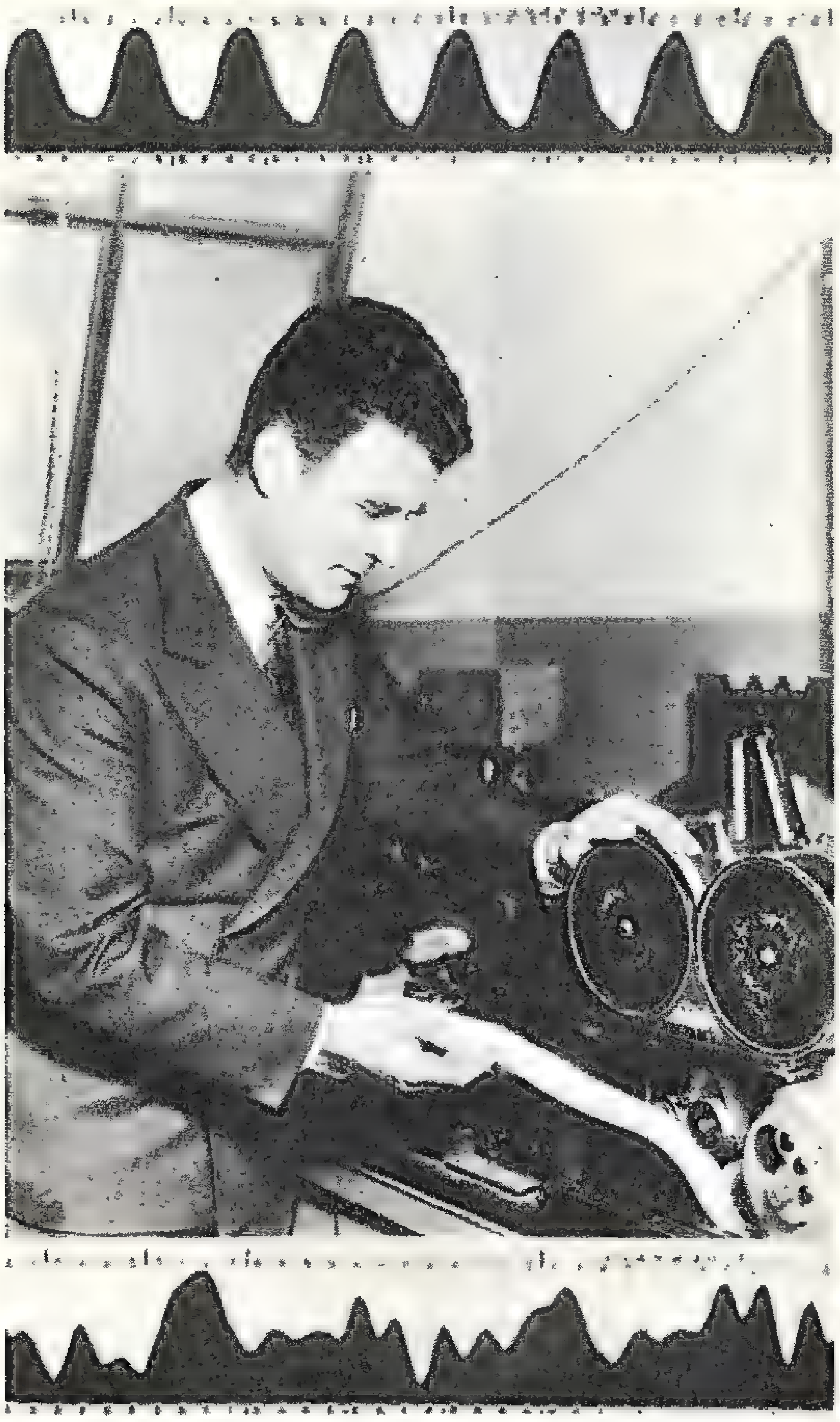
These novel spectacles can be used instead of a microscope. They obtain their microscopic power from specially-processed dark paper.

Film Expert Expects To Record Perfect Voice Pattern

A "DENSITOMETER" developed by Douglas Shearer at the M-G-M studios in Los Angeles puts the sound vibrations of the voice under a microscope and determines exactly what vibrations give certain vocal qualities.

The new instrument operates on the principle of a recording machine. By projecting beams of light the slightest voice fluctuation is magnified 50 times and then photographed on a moving record film.

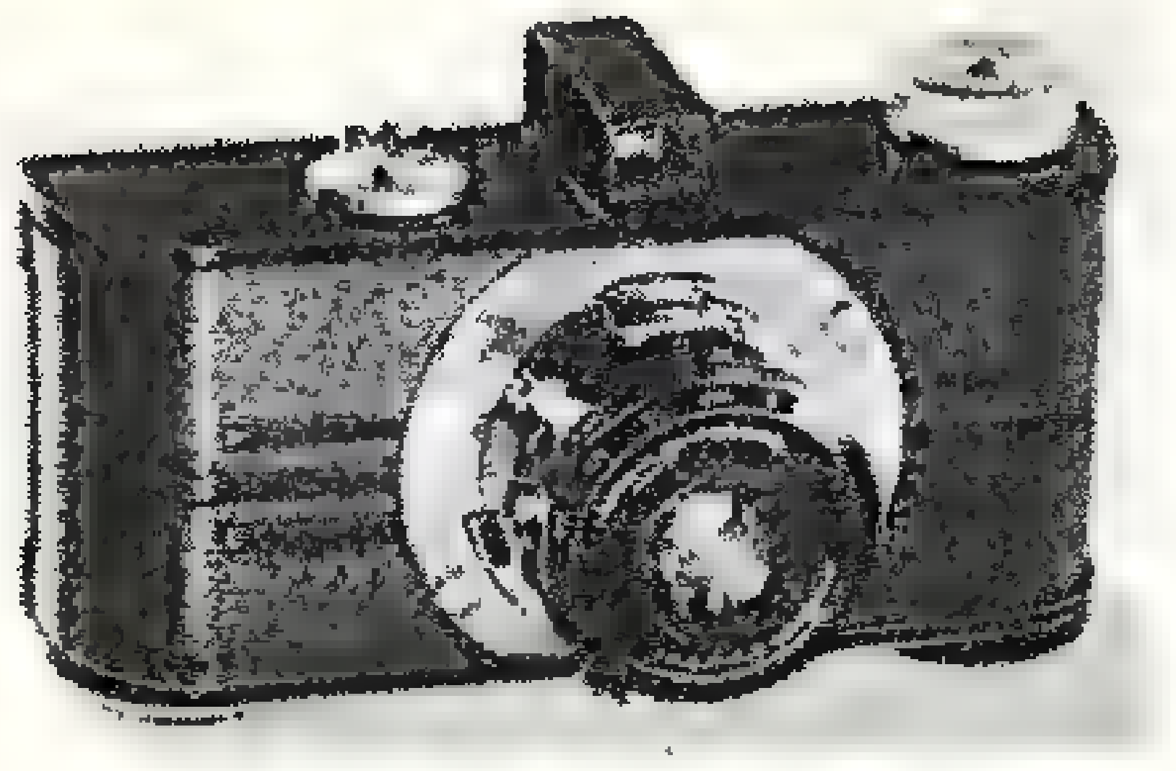
Densitometer tests of Jeanette MacDonald and Sherwood Eddy revealed that both sing an absolutely pure note. Miss MacDonald's test showed a series of evenly spaced uniform hills and dales. Eddy's test showed the same fundamentals spaced four times as far apart.



Douglas Shearer predicts his "densitometer" will furnish the perfect pattern for all voices. At top and bottom are tests made of voices of Jeanette MacDonald and Sherwood Eddy.

Camera Boasts Fast, Adjustable Lens

A NEW midget candid camera utilizing 35 mm. motion picture film has been developed by an eastern research organization. Thirty pictures can be taken at one loading. The unit is produced from rich black bakelite molded with a metal back. The lens may be adjusted for close-ups or to any point on the horizon. The camera also has precision adjustments for diaphram openings and shutter speeds. It can be aimed, focused, and a picture snapped in three seconds.



Utilizing 35mm. film this camera takes 30 photos in one loading.

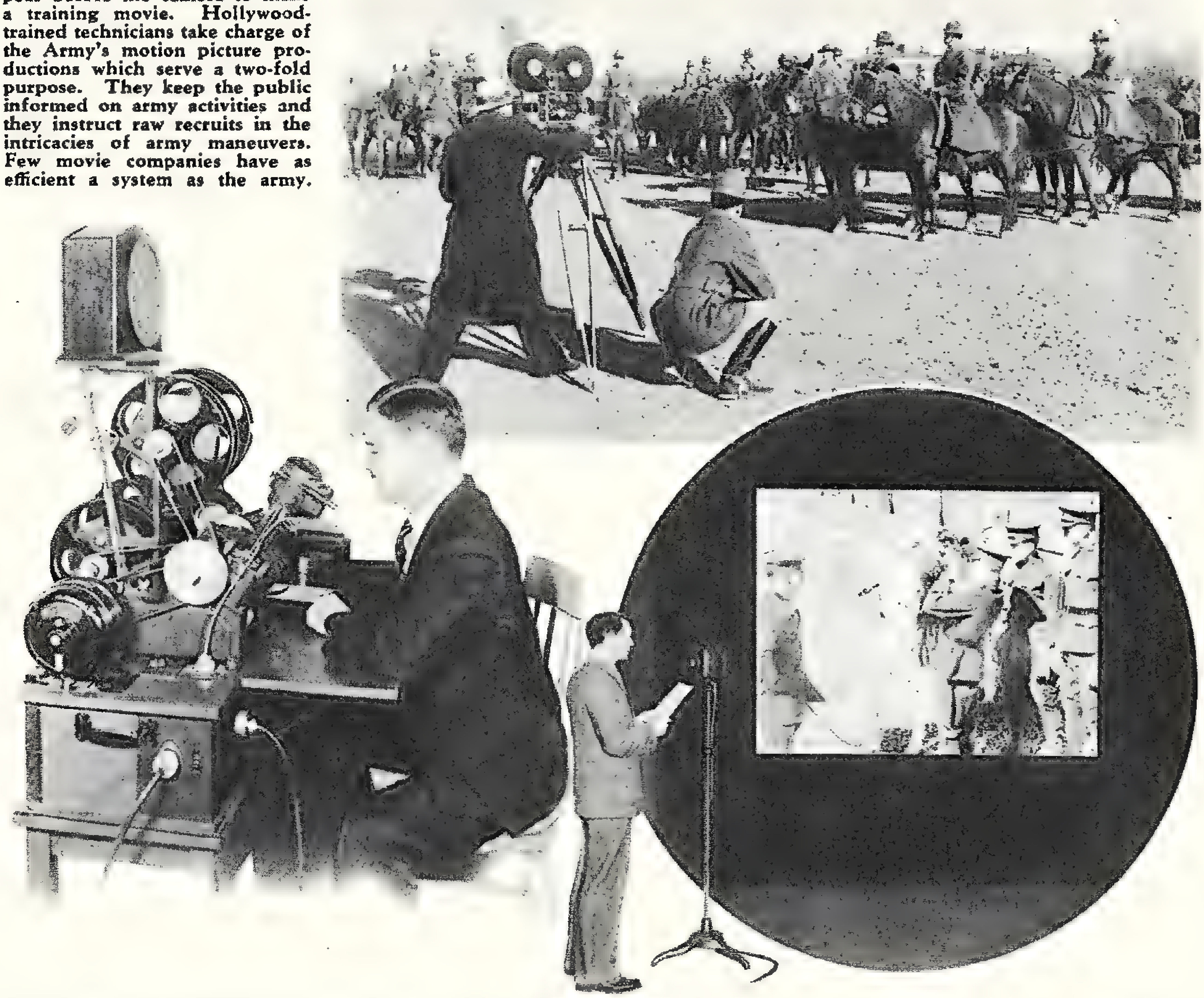
Electric Iron Sprinkles Clothes

This iron is partly filled with water which is heated by the same electricity that heats the iron. The clothes are steam moistened from the bottom of the iron as the ironing goes on.

A NEW type of household electric iron, which looks like other electric irons on the market, sprinkles clothes while it irons them.

Part of the iron is filled with water and heated by the same unit that heats the iron. Clothes being pressed are steam moistened from the bottom of the iron as it passes over them. The steam is released as needed by a trigger in the handle.

UNCLE SAM'S MOVIES Record Army Life



Their horses groomed to the peak of perfection, all equipment freshly polished, officers and soldiers at Fort Myer, Va., appear before the camera to make a training movie. Hollywood-trained technicians take charge of the Army's motion picture productions which serve a two-fold purpose. They keep the public informed on army activities and they instruct raw recruits in the intricacies of army maneuvers. Few movie companies have as efficient a system as the army.

This operator of the Signal Corps cinema unit is synchronizing sound and picture on the "moviola." The army has millions of feet of such film dating as far back as 1908.

Here an army training film is being scored. A prepared lecture is read into the microphone to accompany action on the screen. Recruits are quick to follow this method of instruction.

THE U. S. Army has gone Hollywood! America's fighting men have succumbed to the bright lights of the movie capitol, and now parade on well groomed horses before the eyes of a battery of cameras. In fact, the army is now recognized as one of the largest motion picture organizations in the world.

There is one big difference. The army does not deal in make-believe. When a movie is made, the film is either released to the army posts to be used for instructing raw recruits and training personnel, or it is used to keep the public in close touch with what its army is doing towards national defense.

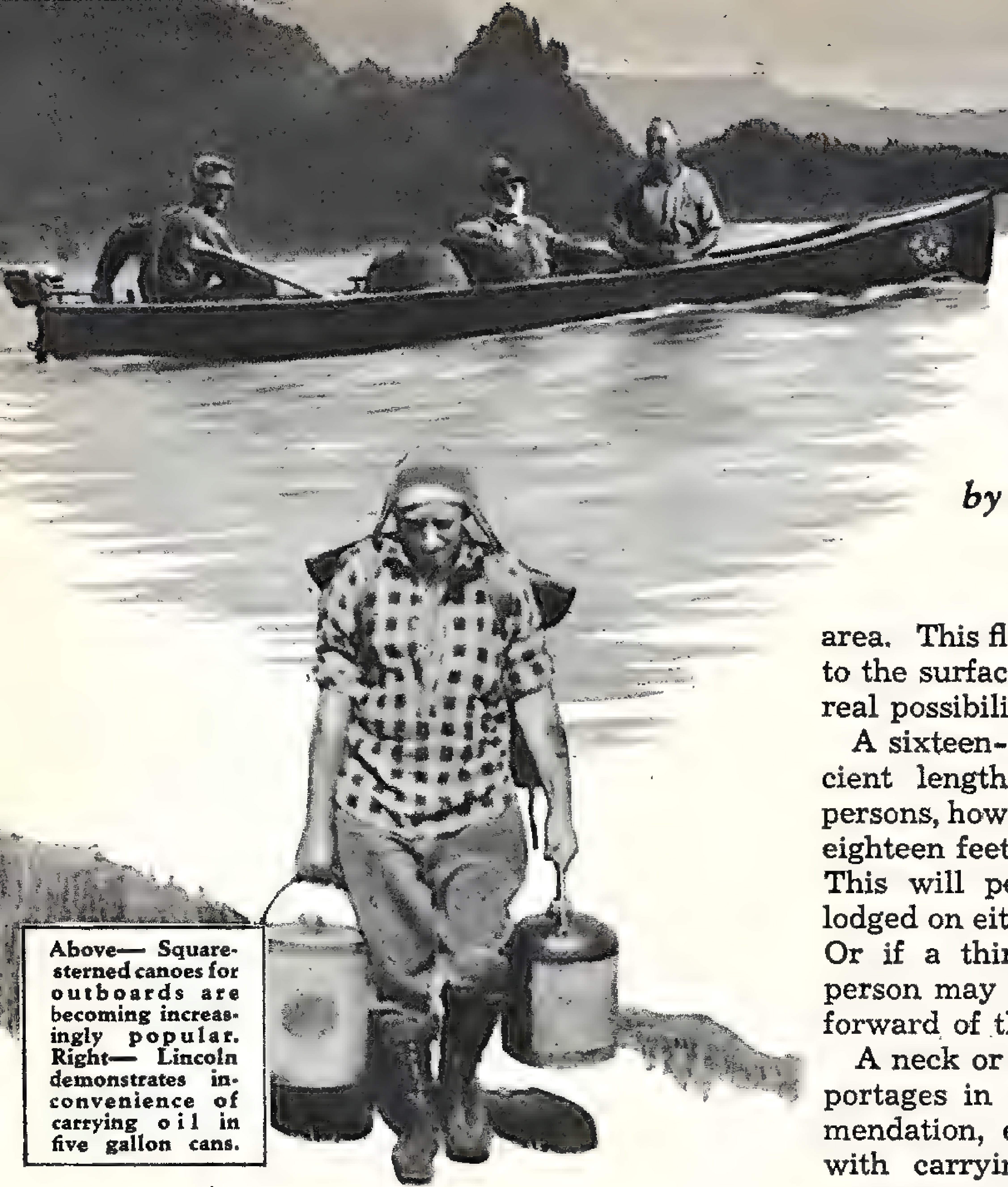
Three major segments of the army are in charge of production. These are the Signal Corps, the new GHQ Air Corps, and a special motion picture section of the regular army. Working under these departments are staffs of Hollywood-trained technicians equipped with the finest sound apparatus and cameras.

Their film records date back to 1908 when the Wright brothers first showed army officials how to fly at Fort Myer, Va. They include the greatest collection of World War movies in the world as well as "shorts" on almost every phase of army life.

At a moment's notice the air corps can send a camera-equipped plane to any part of the country from any one of 15 photo sections located at major airports. The films are not "romances," but they insure safety and adequate defense for the nation.

SPORTSMEN'S Outfitting

by ROBERT PAGE LINCOLN



Above— Square-sterned canoes for outboards are becoming increasingly popular. Right— Lincoln demonstrates inconvenience of carrying oil in five gallon cans.

IN THE estimation of most seasoned wilderness "trippers" there is only one type of boat that really fits into the situation when one is considering an extensive water jaunt and that is the canoe.

The canoe of years ago, and somewhat in the present day, were round-bottomed. As a direct result they had but little gripping power on the water surface and would tip and roll from one side to the other. The canoes of today have not only a most desirable width at beam, but the bottom is almost flat over a generous portion of its area. This flat-bottomed effect makes it cling to the surface in a manner that stalls off any real possibility of the canoe's tipping over.

A sixteen-foot canoe is considered of sufficient length for two persons. For three persons, however, the so-called guide's model, eighteen feet in length, is a recommendation. This will permit of four packsacks to be lodged on either side of the canoe, eight in all. Or if a third person is carried, then that person may be seated toward the stern, just forward of the rear thwart.

A neck or shoulder yoke to be used on the portages in carrying the canoe is a recommendation, especially if you are unfamiliar with carrying the canoe. These simplify portaging at least fifty per cent.

Square-sterned canoes are often used in the north and Canada, where the outboard motor is brought into use. This type of canoe is rather heavy, but where there is comparatively little portaging to do it fits in perfectly; has a generous wide bottom, and is excellent to fish out of.

The impression is often had that the outboard motor may be used only on a square-sterned canoe. As a matter of fact, more outboard motors are used on the everyday sharp-bow, sharp-stern canoe than on the square stern. There is a bracket attachment

The end of a perfect day. The modern canoeist takes his comfort with him into the woods. Air mattresses are replacing the laboriously cut balsam boughs, light tents eliminate lean-tos, while enough dehydrated food for a two weeks' trip can be conveniently packed into a good-sized knapsack.

CAMPFIRE for the Canoe Trip

made especially for canoes of this everyday type, as the result of which the motor is lodged on the side of the canoe, near the stern. Both the twin and single type of motor are used on the canoe. With outboard motors now being had as light as 20 pounds up to 30 pounds the excess baggage thus brought along is not overly great. Indeed, by the use of the motor the length of a canoe trip can be stretched out to twice the distance one would go if just paddling.

The gasoline and oil are mixed together at the start of the trip, and are preferably carried in square gallon tins. These are then lodged in a packsack especially made for the purpose, cut straight as to side and flat bottom, so that the straight-sided tins will rest side by side in a truly compact fashion. A pack of these tins will weigh a little more, but they are far easier conveyed in this fashion than in the regulation five and ten-gallon cans.

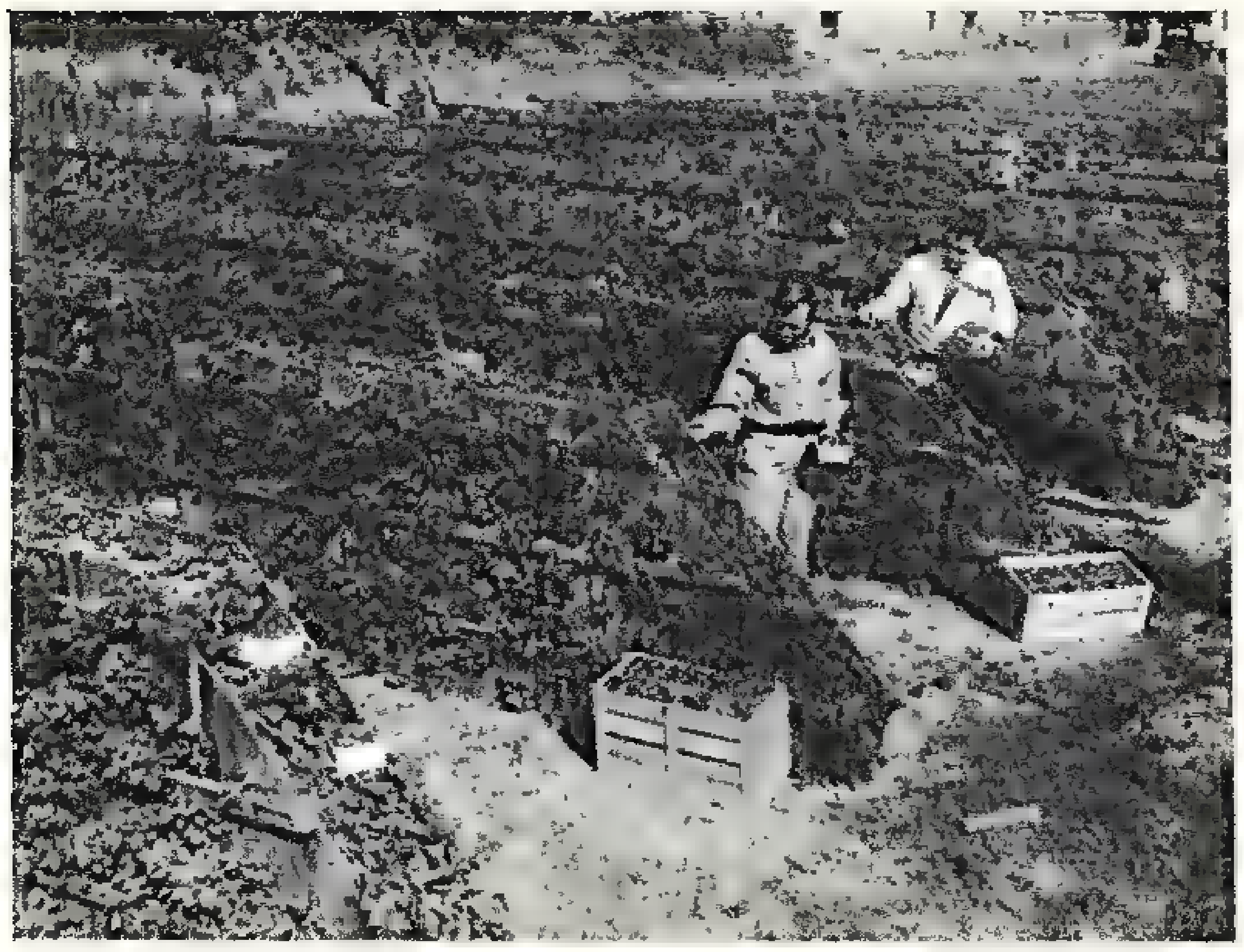
While the canoe leads in consideration on a wilderness trip, it should be remembered that all other items in the outfit, each in its department, require thoughtful selection. Regulation shelter tents of the so-called canoe tent or forester type are much favored. It is a requisite that these tents be so made that all windows and openings be covered with netting or bobbinet, to keep out all winged pests. Usually when the occupants of the tent are in for the night the plumber's candle that is carried for light will reveal any mosquitoes inside. They invariably alight on the canvas, when a touch of the candle flame will singe them. One can thus kill every mosquito inside of the tent. It is necessary to kill each one because one can keep you awake as well as fifty.

Since air mattresses and sleeping bags are often used, and are recommended in

[*Continued on page* 122]

On portages a neck yoke should be used to simplify the task of carrying your canoe through the brush. If you do not have a regular neck yoke, one can be improvised by lashing your paddles to the thwarts parallel to the gunwales. In this way the carved handgrips of the paddles just fit the shoulders, and by moving the paddles back and forth, you can find the best balancing point.

Vertical Strawberry Garden Thrives On Chemical Soil



Here are upright boxes filled with chemically treated soil in which strawberries are inserted through holes drilled in the sides. When placed on wheels, boxes can be moved at will.

FROM Florida comes news of a new portable strawberry garden designed to effect greater sanitation and to save space. The garden is laid out in a series of vertical terraces each 10 feet by 4 feet. The plants are inserted in a soil of predetermined chemical content through holes drilled into the sides of upright boxes. The inventor has more than a hundred of these terraces so arranged as to provide a maximum saving in space.

Gleaming with green leaves and luscious red strawberries, the garden is now on exhibit in Miami. A yield in excess of planting under ordinary conditions has been forecast.

Device Electrocutes Floating Germs

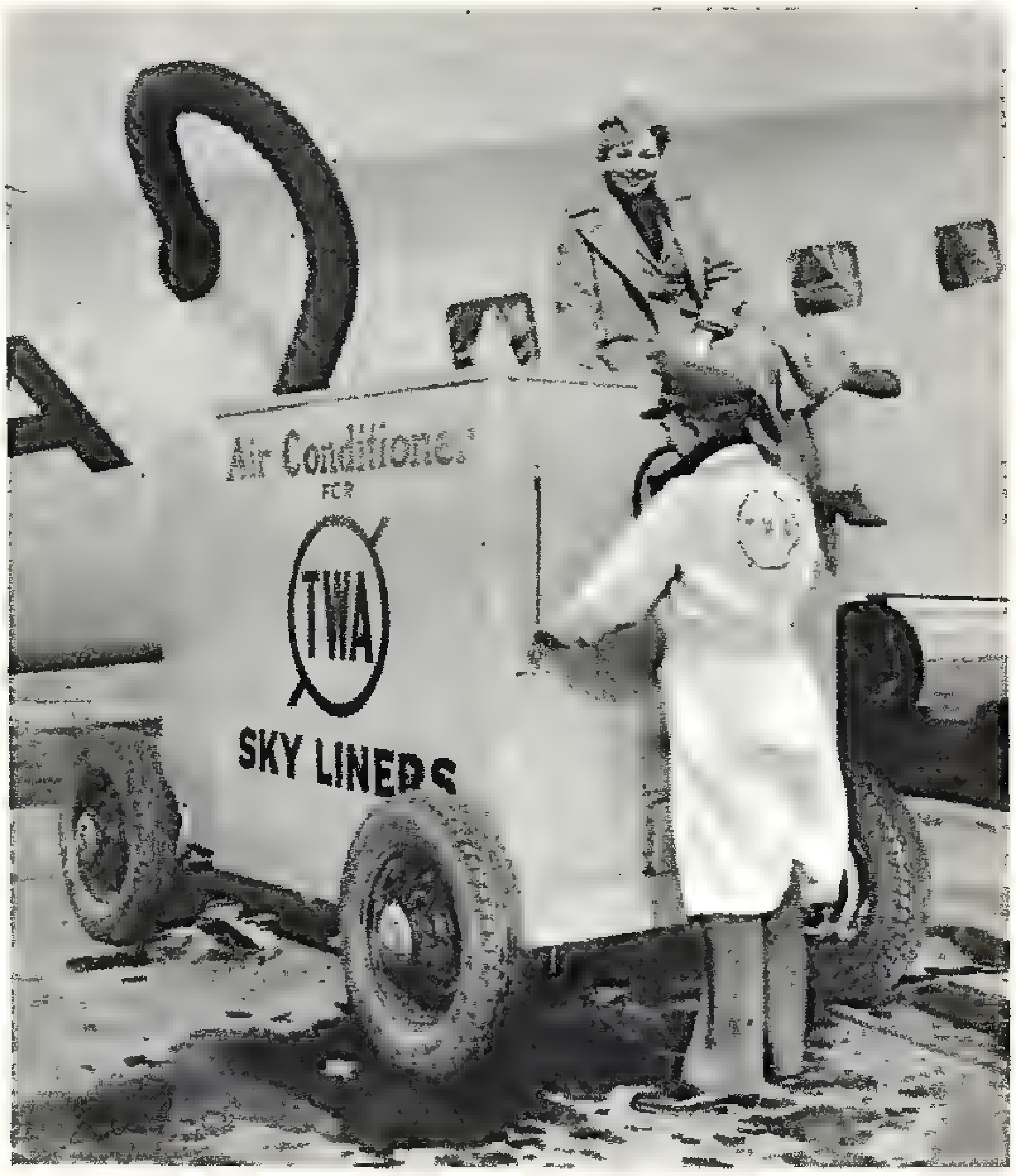
A METHOD of electrocuting floating germs without pinning the fatal electrodes to their bodies has been worked out by two French physicists. By a special process germs are attracted to high voltage wires. The slightest touch then kills them. The process is expected to be useful in hospitals.

French Car Boasts Automatic Top

A ROADSTER designed by a French manufacturer boasts the latest in automatic motor car devices, a top which slides up in position or down into the back of the car without any exertion by the driver. He has only to press a button to set the mechanism in operation. The roadster has an electrical appliance installed in the back to which an accumulator supplies the current.

This French roadster is equipped with an automatic top which slides up or down into the back of the car without any effort. The driver simply presses a button next to the steering wheel.

Machine Cools Or Heats Sky Liners



Cooling the plane's interior in the summer and heating it in winter just before it starts out on its trip across the skies is the duty of this four-wheeled electric air conditioner.

AN AIR conditioner which forces cool air in summer and hot air in winter into a plane's cabin forecasts a new era of comfort in air travel.

The machine contains a 250-gallon tank filled with calcium brine. In winter, steam-heated air is drawn into and then forced out of the tank into the plane's interior through a hose. In summer the conditioner connects with a refrigerator through which the brine circulates at 40 below zero. The machine is mounted on four wheels and can be shifted around the airport.

Flexible-Axle Eight-Wheel Truck Rolls Over Rough Roads

AN UNUSUAL type of mechanized motor transport has been built to carry oil in bulk to the Persian Gulf from oil fields 400 miles distant. Built with eight master wheels, the tanker boasts an oil capacity of 3,700 gallons.

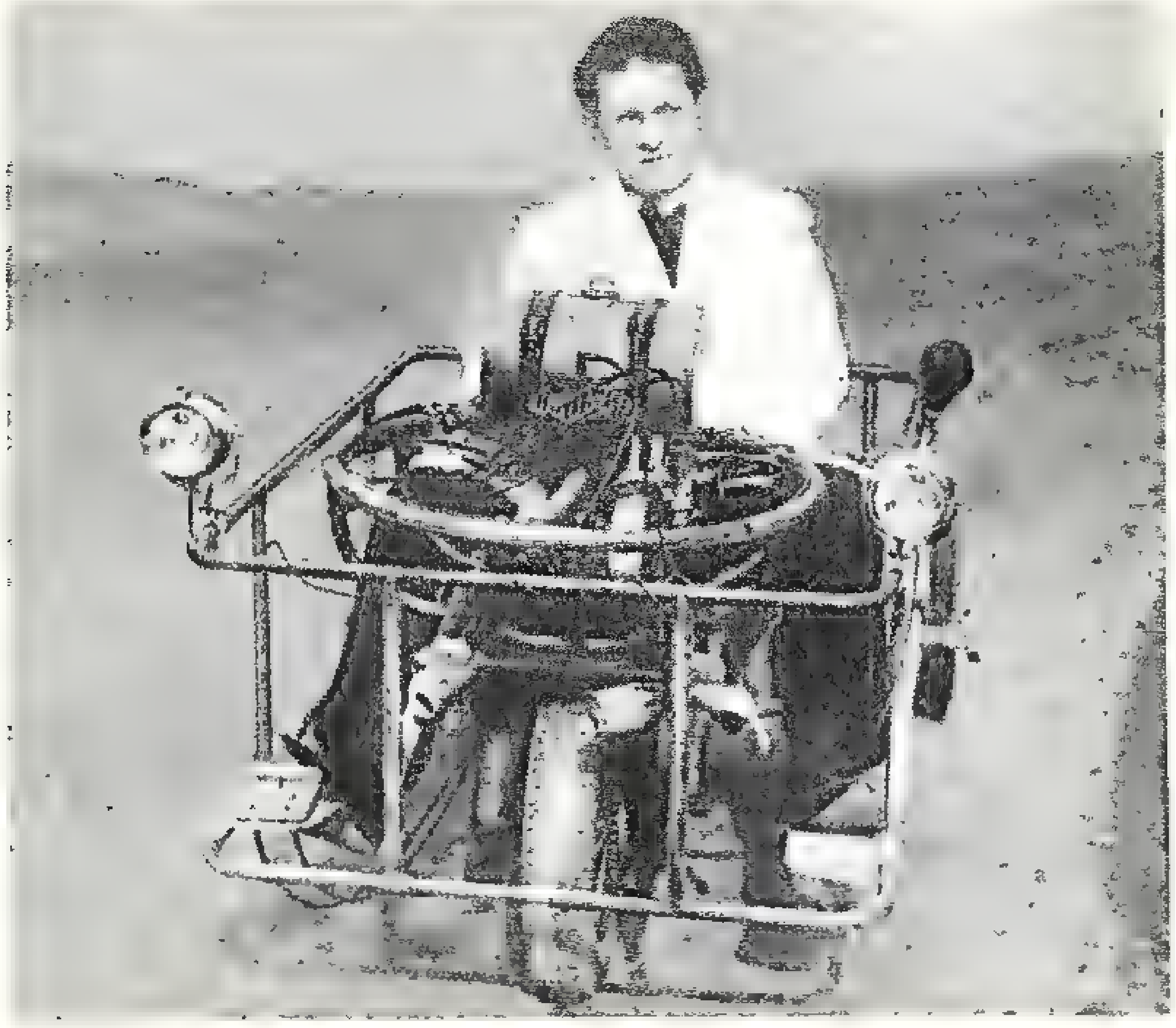
Its route will cross a mountain pass 8,000 feet high filled with hairpin bends, cross a snow covered plateaux, and follow a badly conditioned road along the edge of a 1,000-foot precipice. Each wheel is independently mounted and all can be braked simultaneously. The frame, like the human backbone, runs the whole length of the chassis.

The unusual springing of the craft's wheels permits it to travel over unusually rough roads with the wheels uniformly distributing the weight at all times.

ANGLO-IRANIAN OIL

Used to haul oil to the Persian Gulf from fields 400 miles away, this 8-wheeled, 3,700-gallon tanker crosses a mountain pass 8,000 feet high. All 8 wheels can be braked at once.

Odd Motorcycle Puzzles Parisians



The inventor plans to drive this 3-wheeled motorcycle from Paris to Berlin. Police arrested him on his first trip out because they had no licensing classification for the vehicle.

A THREE-WHEELED motorcycle powered by a one horsepower motor will chug along from Paris to Berlin if the plans of Robert Dozin, its inventor, mature.

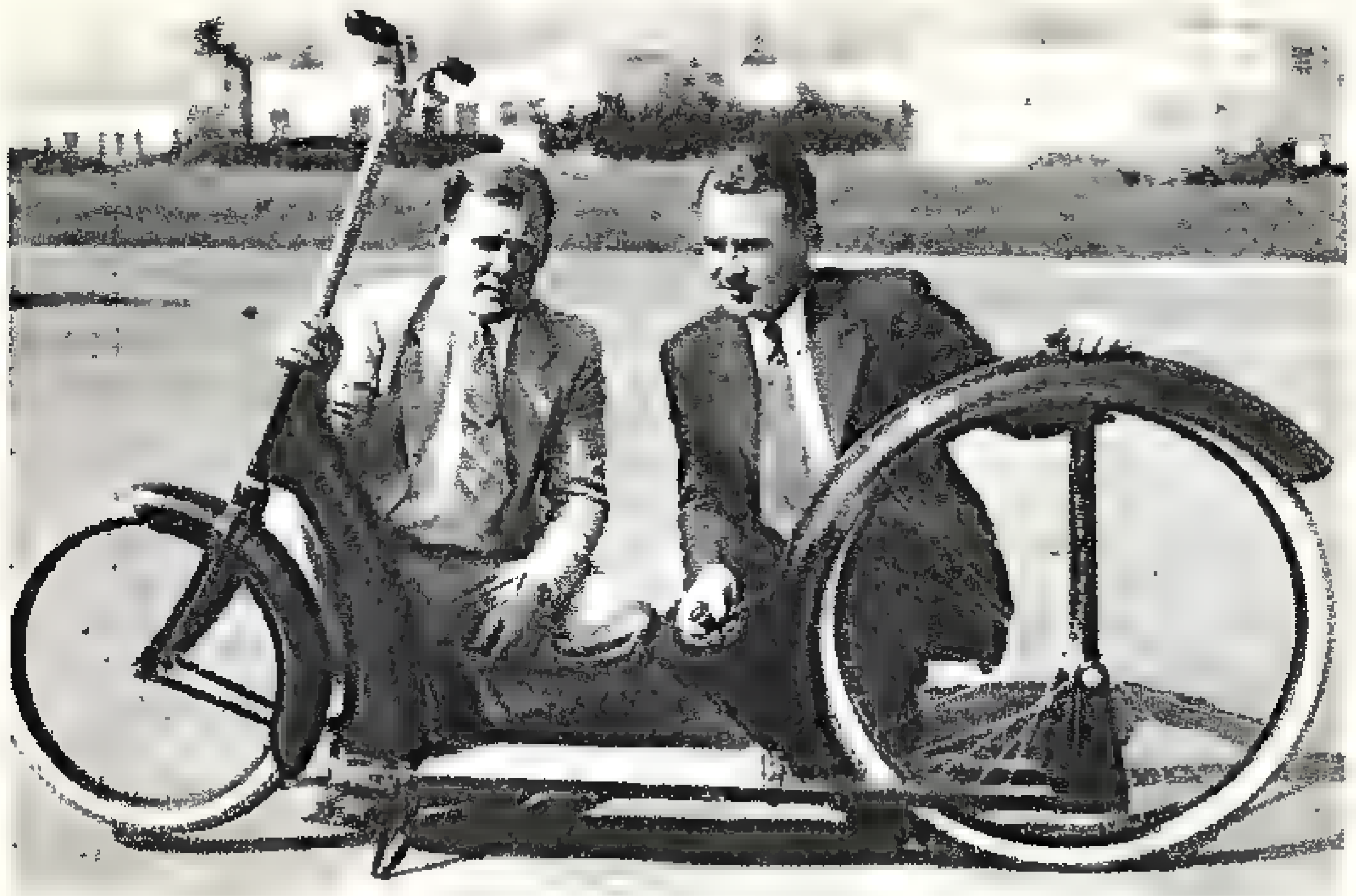
Paris gendarmes arrested Dozin on his first trip out. Because they had no licensing classification for such a vehicle. The cycle is unique in that the driver is caged in by surrounding steel bars. Two headlights and a horn are mounted to the bars. The lower bars are also equipped with rests for the driver's feet. Fastened over a circular steel frame above the front wheel is the motor and gas tank. The vehicle is capable of speeds of 25 m.p.h.

Huge Sprays Used To Color Pottery

UTILIZING new designs and colors, a California pottery expert, Mrs. R. A. Hickman, has worked out a new method for producing colored pottery. The actual modeling is done with a special clay secured from California hills. Following the modeling, the pottery is designed. Then the potter adds the finishing touches by donning a gas mask to wield a huge nozzle for spraying with pigmented fluids. Baking at high temperatures brings out the color of the sprays.

A California woman has invented a new method of coloring pottery. Donning a gas mask, she sprays it from a huge nozzle. Baking in high temperatures brings out color of sprays.

Bicycle Without Pedals or Gears Catching Popular Fancy

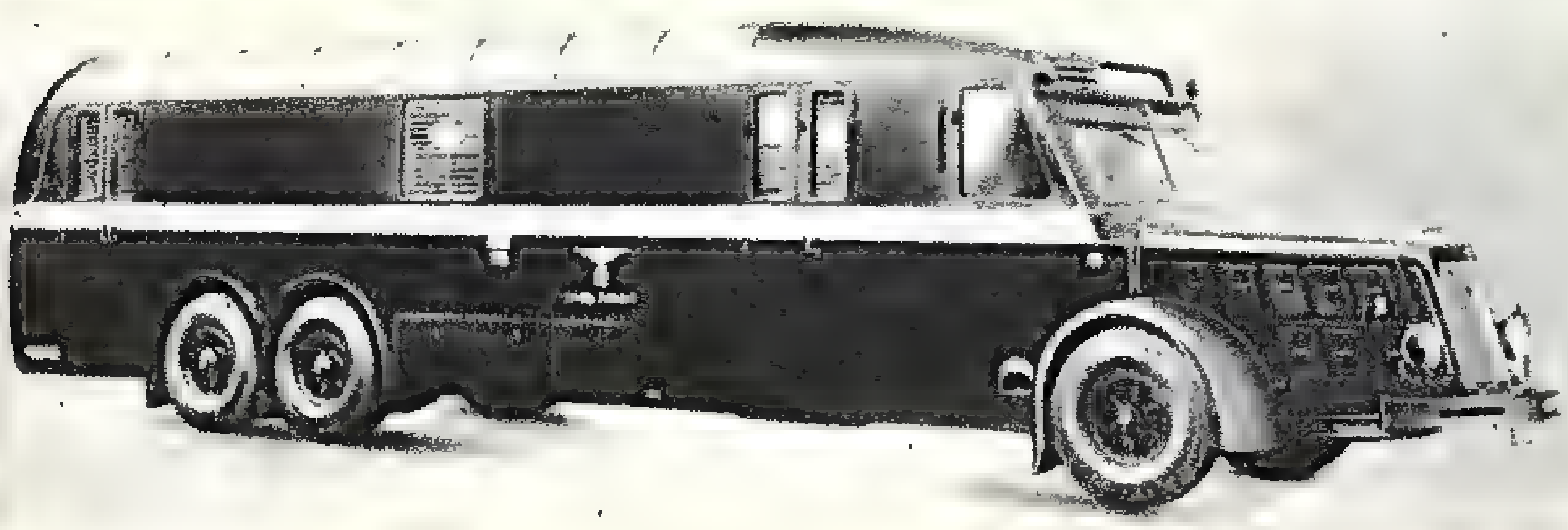


This Ingo-Bike has neither pedals nor gears. Instead, it utilizes springboard action to attain a speed as fast as 20 miles an hour. Two brothers spent 2 years perfecting it.

A BICYCLE without pedals, the "Ingo-Bike," harnesses the free power in the end of a flexible scooter board. A Negro boy with a home-made scooter gave the Huyssen brothers the idea for their Ingo-Bike. The lad's weight released from the rear of his scooter board sent the scooter bouncing forward. The brothers set to work to harness this free power. The result, after two years of work and more than 50 models of spring platform bicycles, was the Ingo-Bike. It attains a speed of 20 miles an hour.

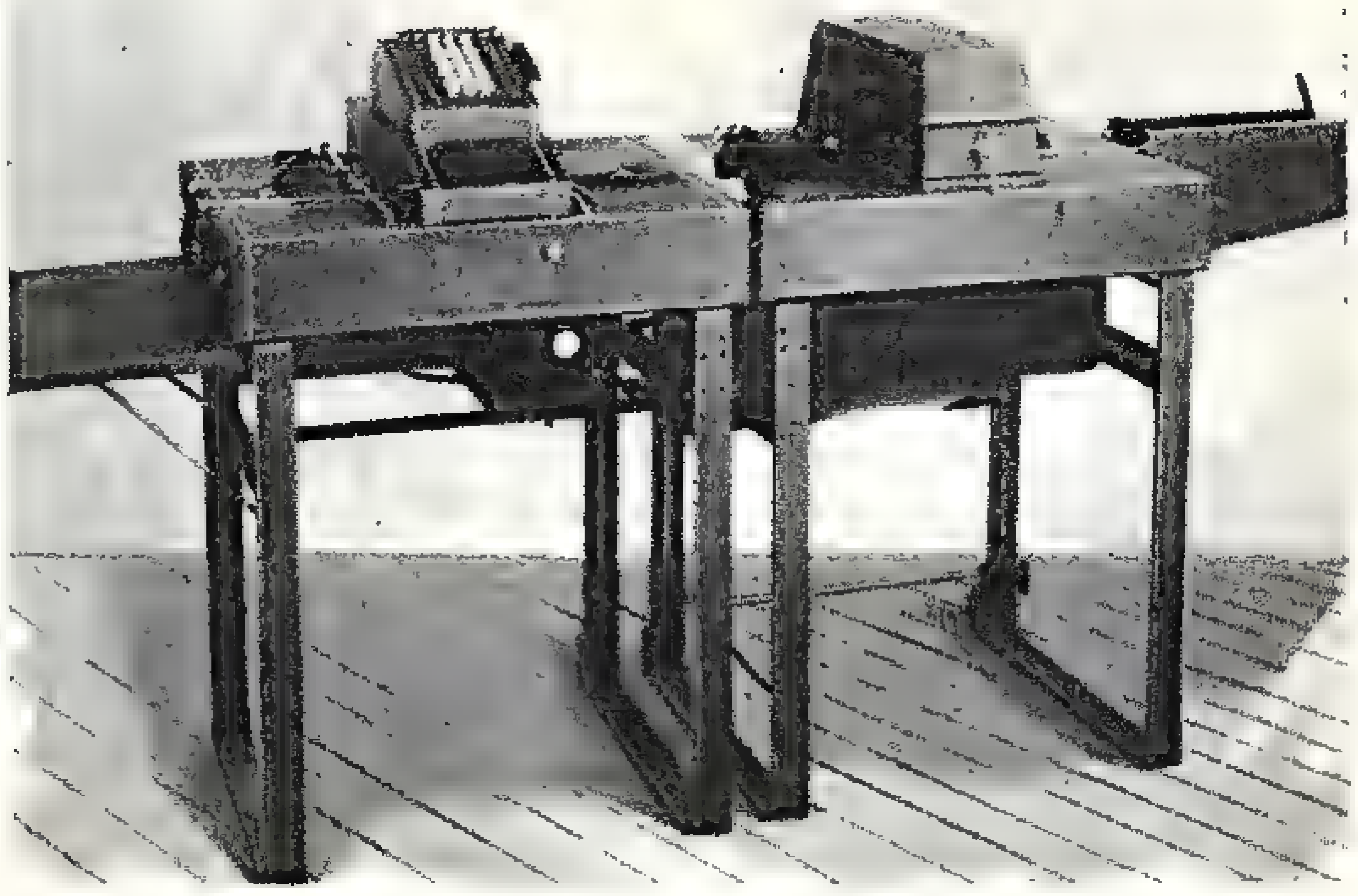
German Mail Bus Placed in Service

A FLEET of six-wheeled master buses has been placed in service by the German Postal Department. The buses are powered by 150 h. p. Diesel engines and are intended to expedite mail deliveries from the main postal centers to the provinces. Equipped for sorting and handling mail en route, they also boast windows which afford perfect illumination during daylight hours.



A fleet of these buses has been placed in service by the German Reichpost. They are especially designed for handling mail en route. Powered by 150 h.p. Diesel engines, they run from the main postal centers to the provinces.

Machine Makes Issuing Checks Easy



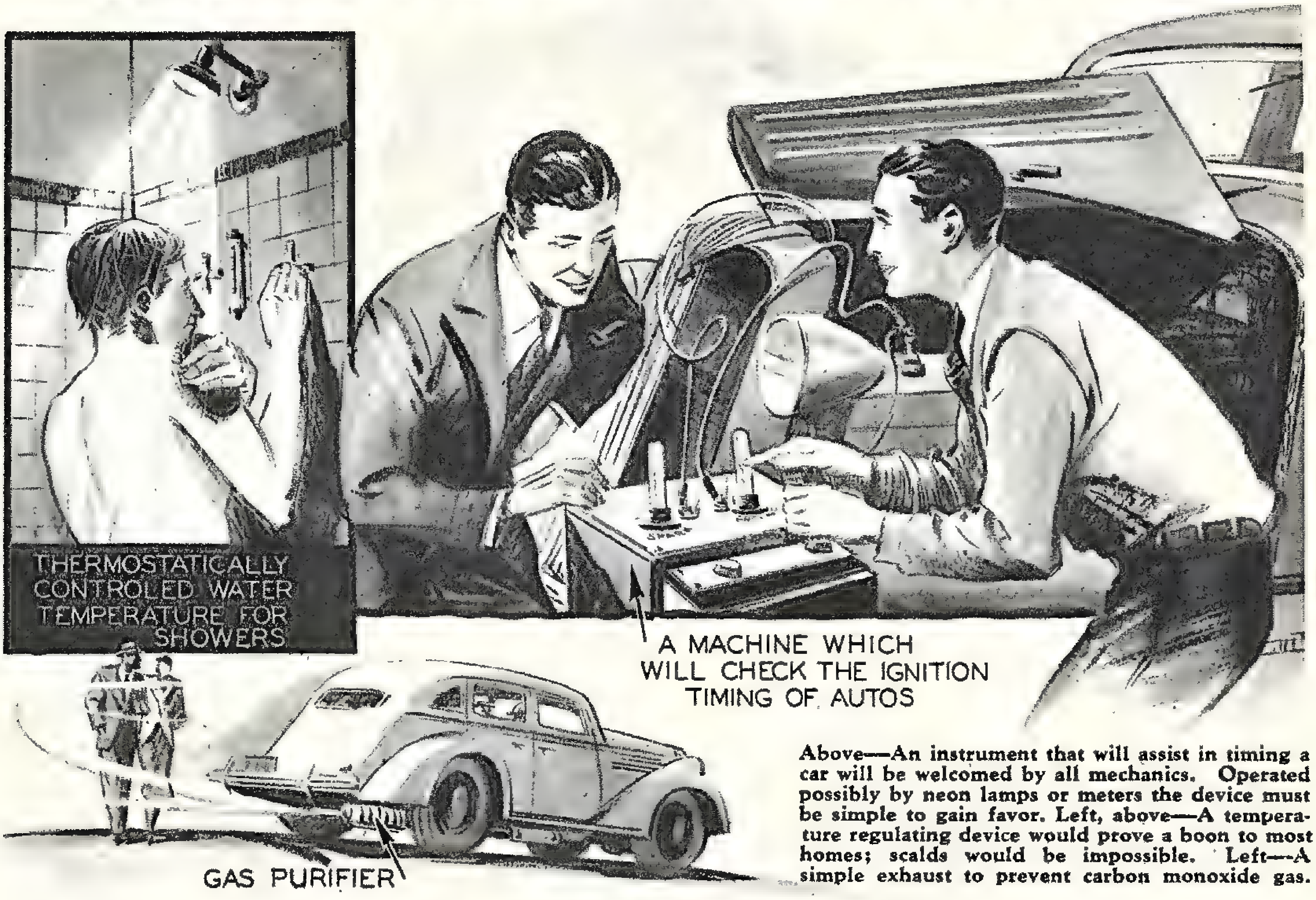
This electric protectograph working in tandem with the check signer on the right can turn out 2,500 checks, written, signed, and numerically stacked in an hour. They also operate singly.

AN ELECTRIC Protectograph, the latest development in the field of mechanical protection for money in transit, operating in tandem with a check signer, can turn out 2,500 checks, written, signed, and numerically stacked in an hour.

Operating as a single unit, the electric protectograph is capable of an hourly volume of 1,500 checks of different denominations or 2,500 identical checks under average manipulation by an average operator. This output can be increased approximately 1,000 an hour with an experienced operator. The total capacity of the protectograph is 3,800 checks an hour.

For smaller firms the hand protectograph solves the problem of issuing large numbers of checks. Both the electric and hand protectograph write checks up to $99,999.99.

MORE CASH PRIZE WINNERS ANNOUNCED in $50.00 NEEDED INVENTIONS Contest


THERMOSTATICALLY CONTROLED WATER TEMPERATURE FOR SHOWERS
A MACHINE WHICH WILL CHECK THE IGNITION TIMING OF AUTOS
GAS PURIFIER

Above—An instrument that will assist in timing a car will be welcomed by all mechanics. Operated possibly by neon lamps or meters the device must be simple to gain favor. Left, above—A temperature regulating device would prove a boon to most homes; scalds would be impossible. Left—A simple exhaust to prevent carbon monoxide gas.

"AND why didn't someone think of that before?" is the question many readers will ask themselves after learning of the latest winners in the MM Needed Inventions Contest. It is the simple idea which makes the great invention and simple ideas are what the contest judges want.

Francis W. Oliver, of San Mateo, California, suggested that some ambitious inventor perfect a system for quickly checking the ignition timing of automobile engines and took first prize of $25 for the idea. Mr. Oliver believes that a system of electric or neon lamps might be connected into the ignition circuit to indicate the firing order of the plugs. In this way the eyes being much more sensitive than the ears would detect the slightest error as indicated by the lamps.

PRIZES

First Prize	$25.00	in Cash
Second Prize	10.00	in Cash
Third Prize	5.00	in Cash
Three Fourth Prizes	2.00	each
Four Fifth Prizes	1.00	each
Total—10 Prizes	50.00	in Cash

Each month Modern Mechanix, Hobbies and Inventions offers cash prizes to the 10 readers submitting the best ideas for the most needed inventions of today. The ideas need not be of technical nature. In fact, a simple idea for use in the garage, workshop or home stands a better chance than a complicated device suitable for use in a limited field.

For example: The second prize winner, A. H. Johnson, of Washington, D. C., submitted the idea of an adjustable temperature control for shower baths. Mr. Johnson believes that if some device where installed in the plumbing systems in apartment houses and hotels painful scalds caused by overheated water might be avoided. A simple control mounted on the wall would eliminate all possible danger.

Allen W. Torbert, Baltimore, Maryland, recommends an attachment for automobiles that will render carbon monoxide gas harmless. "Such an invention," says Mr. Torbert, "would save many lives and at the same time make cities with heavy traffic more healthful."

[*Continued on page* 124]

Building Usefulness Into

THE basement, long the repository for cobwebs, lumber scraps, and discarded junk, is rapidly undergoing a transformation which will make this long neglected room one of the most popular in the house.

In a recent contest sponsored by the American Radiator Company among members of the New York School of Fine and Applied Art, 36 notable examples of what can be done with a cluttered up basement were presented. Working from floor plans and photos of actual cellars, the students built models of sports rooms, hobby rooms, play rooms, studios and all-around utility rooms.

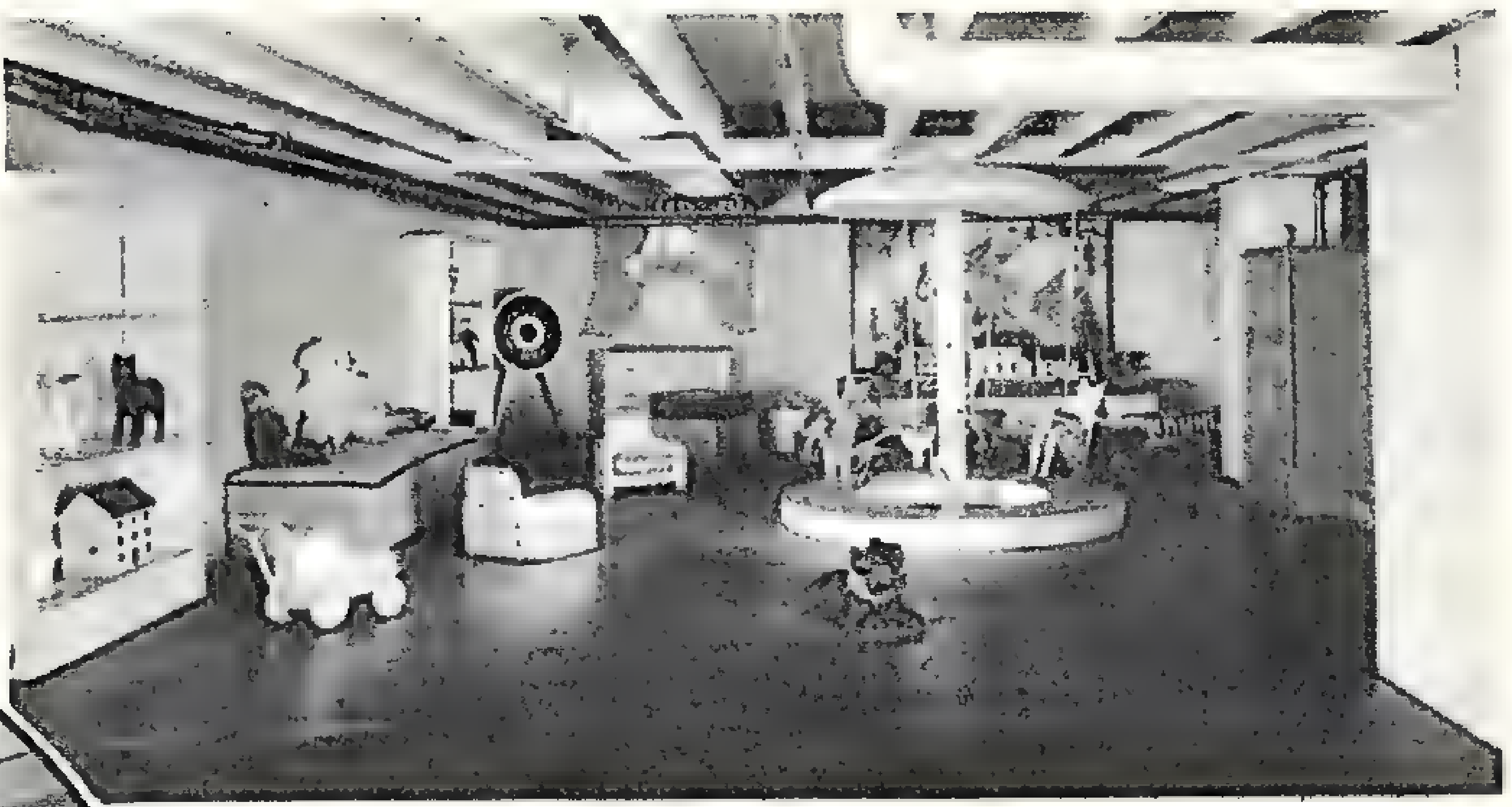
The contestants tackled the problem by disguising obstructive beams and pipes with an all-over color scheme of unified colors. Basement pillars were used as the center for circular benches, tables or cabinets, while the floors were painted or covered with linoleum. The rough plaster walls were painted in pleasing colors, and in many cases were concealed behind shelves, book cases, or covered entirely with paneling.

The model basements, placed on display in Rockefeller Center, New York, immediately focussed nationwide attention on the Ugly Duckling of the home. Architects hurriedly

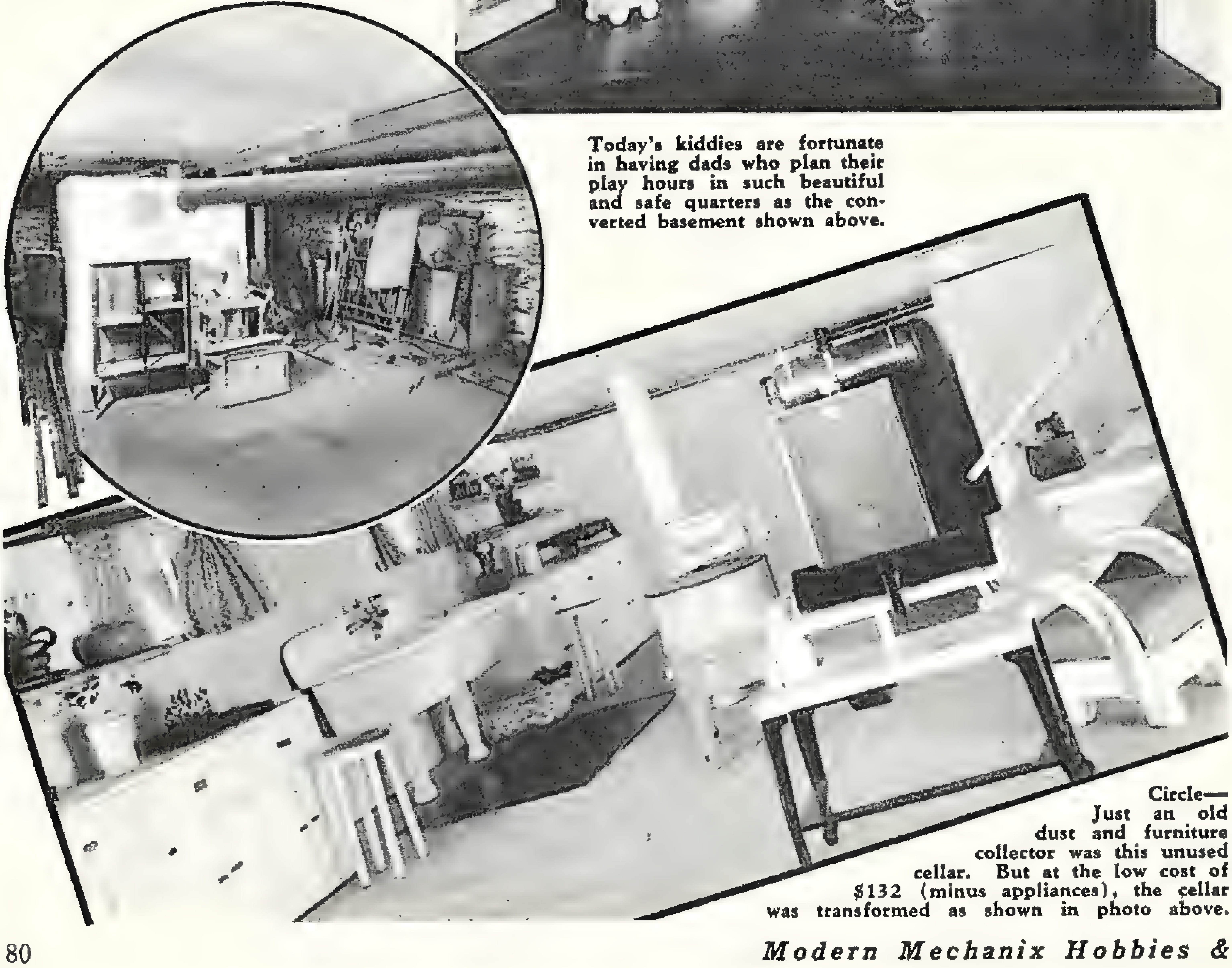
COST OF CONVERTING CELLAR INTO PLAYROOM

STRUCTURAL ALTERATIONS	
Erection of partition	$18.00
CABINET WORK	
Merry-go-round, shelves, train table, etc.	64.00
PAINTING	
Walls, ceiling, floor and furniture, including paper "mural"	75.00
	$157.00

Special Furnishings, $83.00

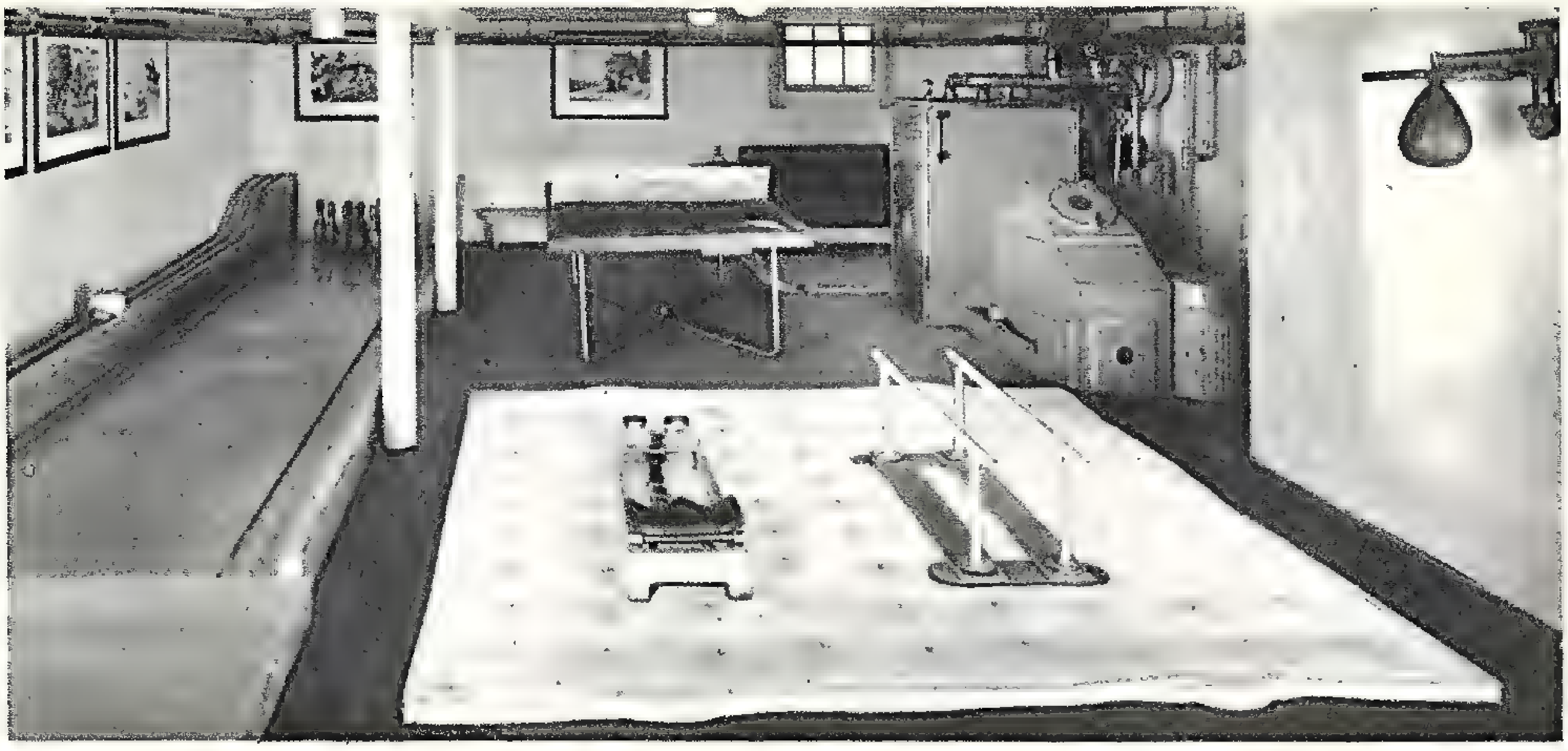


Today's kiddies are fortunate in having dads who plan their play hours in such beautiful and safe quarters as the converted basement shown above.



Circle—Just an old dust and furniture collector was this unused cellar. But at the low cost of $132 (minus appliances), the cellar was transformed as shown in photo above.

Your Neglected Basement

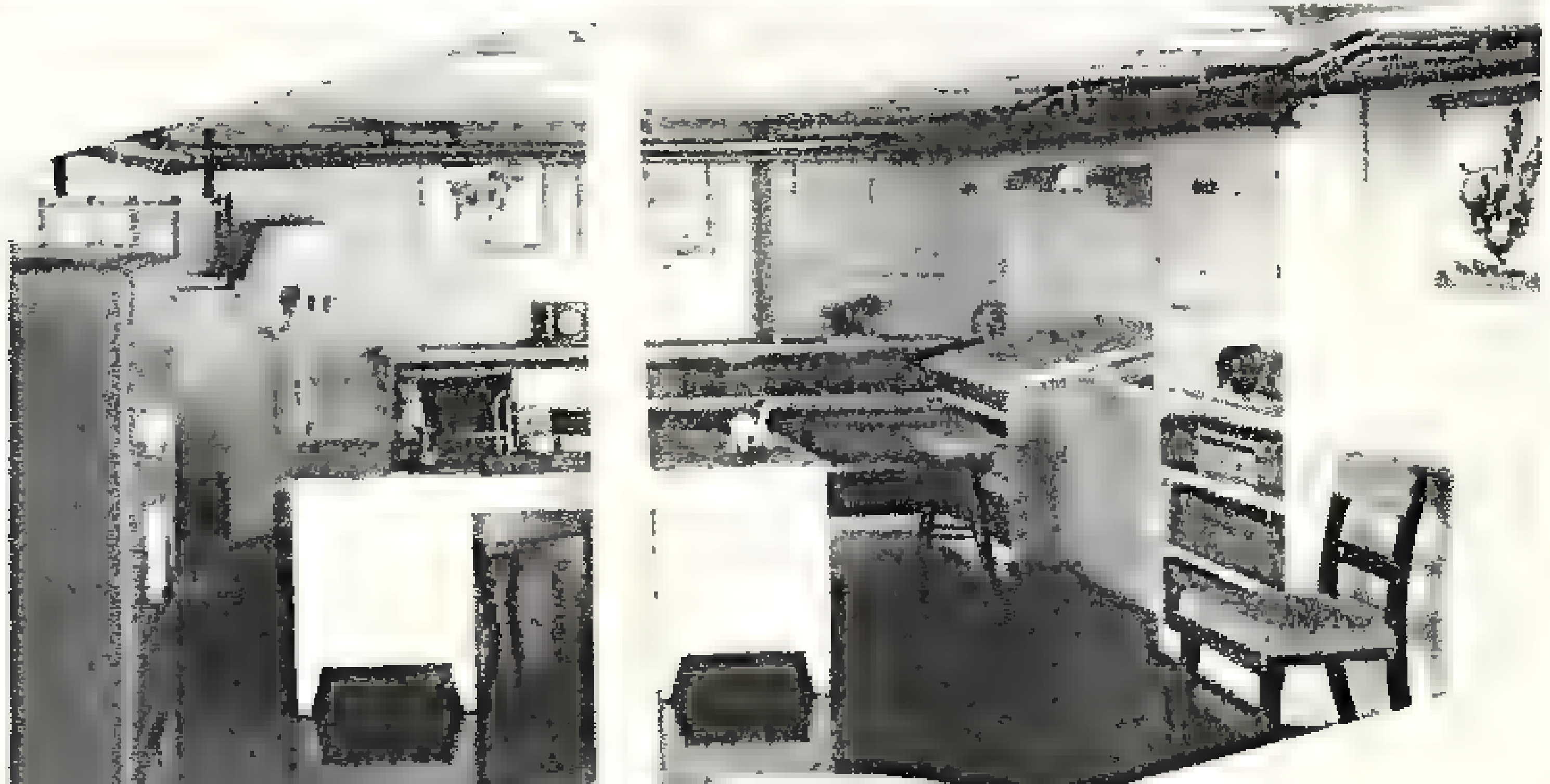


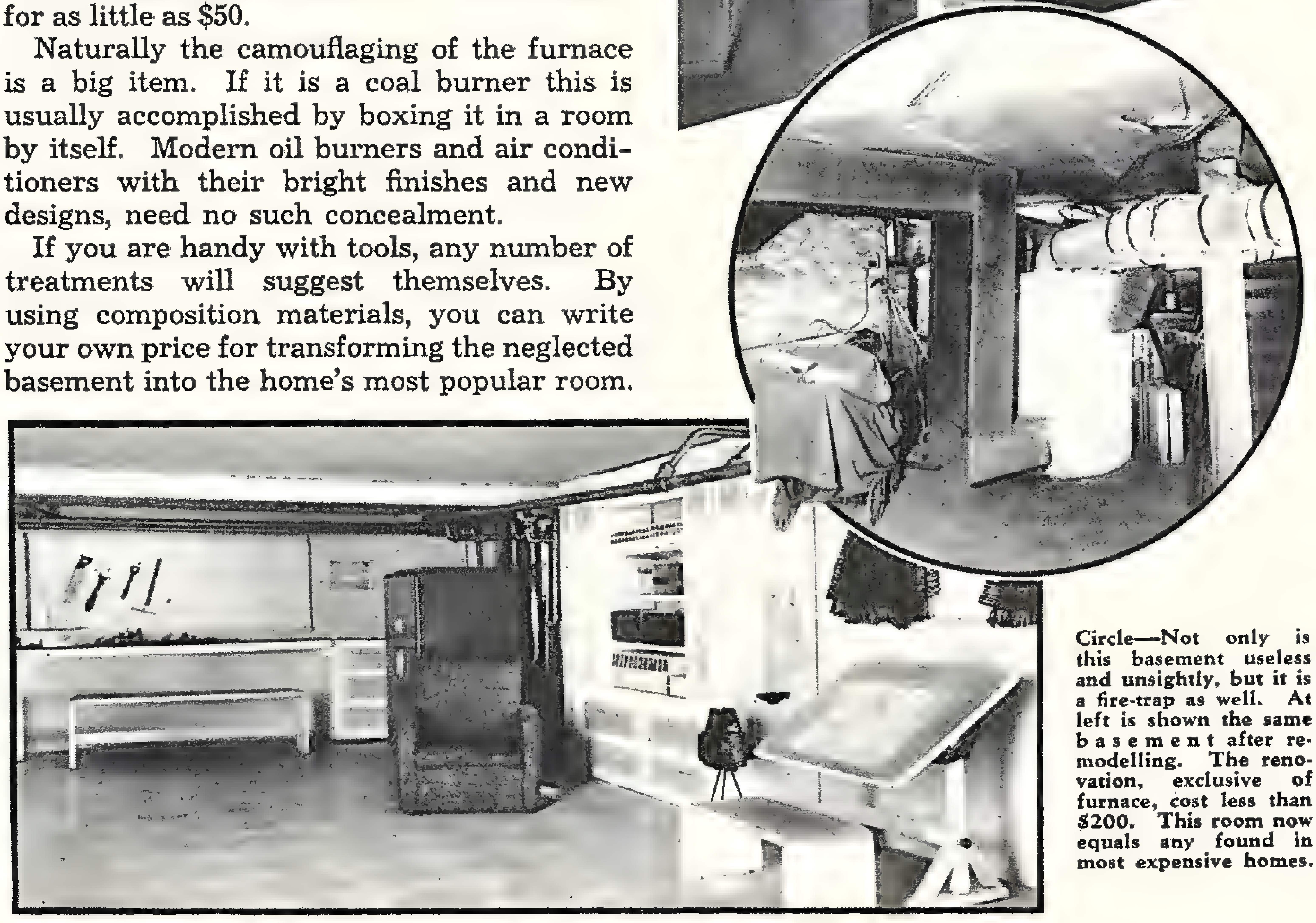
This basement belongs to an athlete, with the construction cost (without gymnasium equipment), 190 well-spent dollars. The draftsman (right) spent $235 for his home hobby.

began making estimates on the costs of converting disreputable basements into charming rooms. They found that even in the most horrible examples the restoration would not exceed $400, while with the exercise of a little ingenuity, miracles could be wrought for as little as $50.

Naturally the camouflaging of the furnace is a big item. If it is a coal burner this is usually accomplished by boxing it in a room by itself. Modern oil burners and air conditioners with their bright finishes and new designs, need no such concealment.

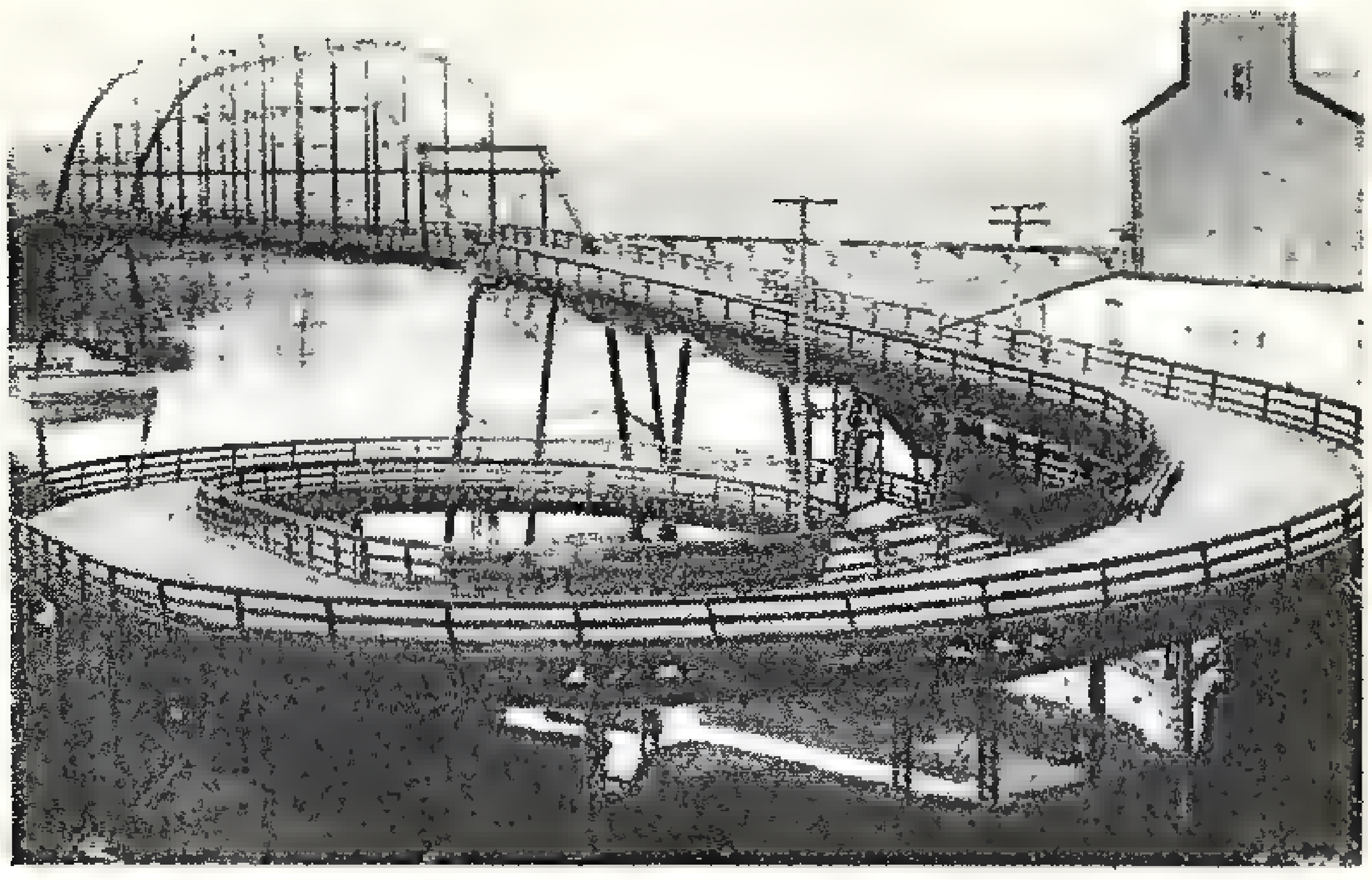
If you are handy with tools, any number of treatments will suggest themselves. By using composition materials, you can write your own price for transforming the neglected basement into the home's most popular room.





Circle—Not only is this basement useless and unsightly, but it is a fire-trap as well. At left is shown the same basement after remodelling. The renovation, exclusive of furnace, cost less than $200. This room now equals any found in most expensive homes.

Minnesota Bridge Has Ramp That Goes Round And Round



This Minnesota bridge, built high over the Mississippi to give river steamers enough head-room, has an approach ramp that spirals groundward to permit automobile vehicular traffic.

HASTINGS, MINN., solved the problem of building a bridge high enough over the Mississippi to permit head-room for river steamers, but the solution posed a still more difficult problem, the building of a ramp which would not be too steep, but which would still enter the town without overshooting the main street.

The result is the famous spiral ramp. Beginning at the bridgehead this ramp spirals groundward in gentle gradients until it leads into one of Hastings' main thoroughfares.

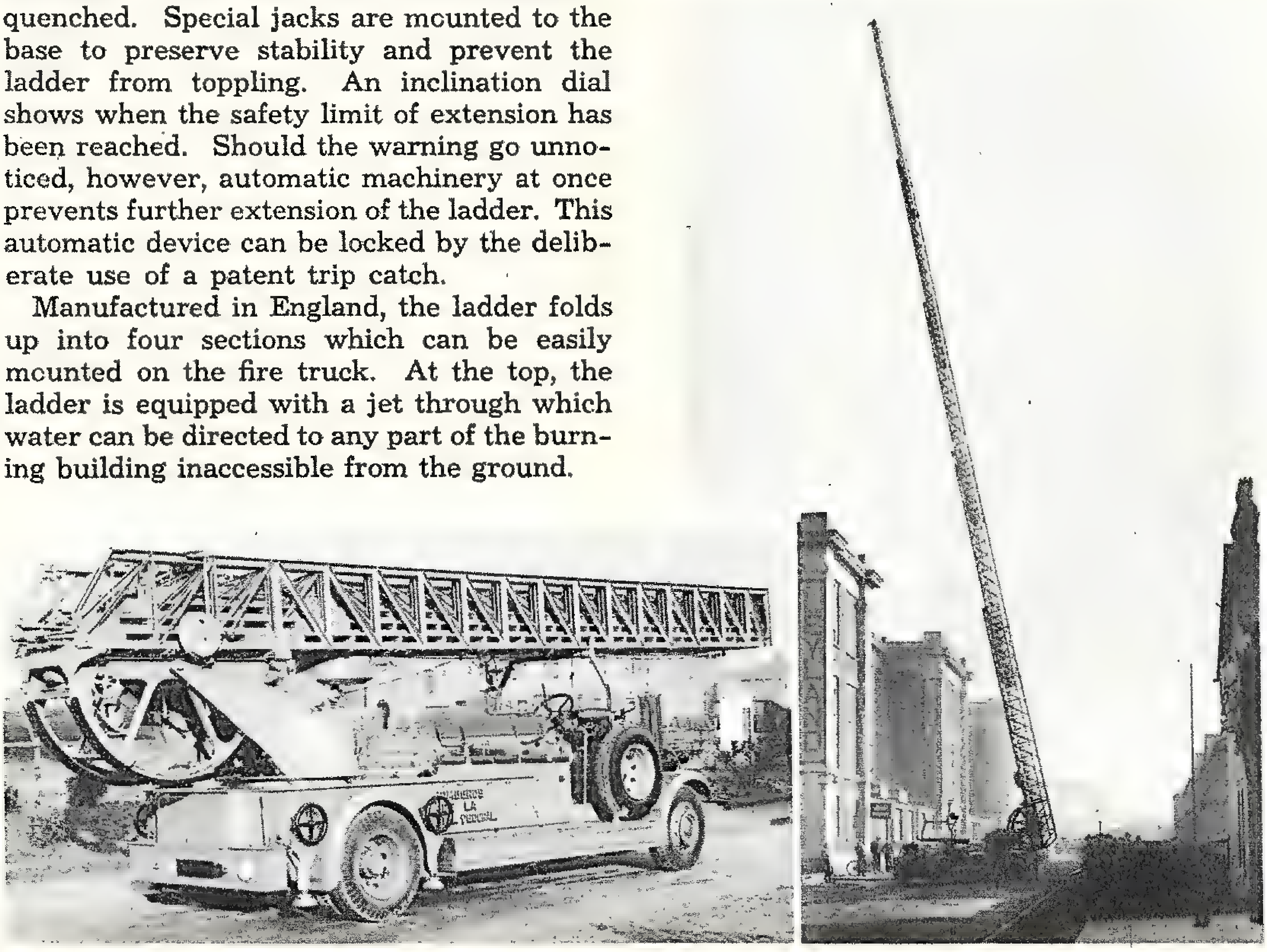
Fire Ladder Rises Skyward 164 Feet

THE loftiest fire ladder in South America, 164 feet high, has just been placed in service by the fire department of Buenos Aires, Argentina. With its assistance rescues can be effected from the roof of 15-story building. Roof fires can be immediately quenched. Special jacks are mounted to the base to preserve stability and prevent the ladder from toppling. An inclination dial shows when the safety limit of extension has been reached. Should the warning go unnoticed, however, automatic machinery at once prevents further extension of the ladder. This automatic device can be locked by the deliberate use of a patent trip catch.

Manufactured in England, the ladder folds up into four sections which can be easily mounted on the fire truck. At the top, the ladder is equipped with a jet through which water can be directed to any part of the burning building inaccessible from the ground.

New Process Turns Out Clean Dirt

CLEAN dirt required by florists and specialty growers can be obtained electrically by a sterilization process similar to that employed in the pasteurization of milk. The process kills such plant enemies as weed seeds, insect life, and fungi, leaving the ground pure for the flower seeds.



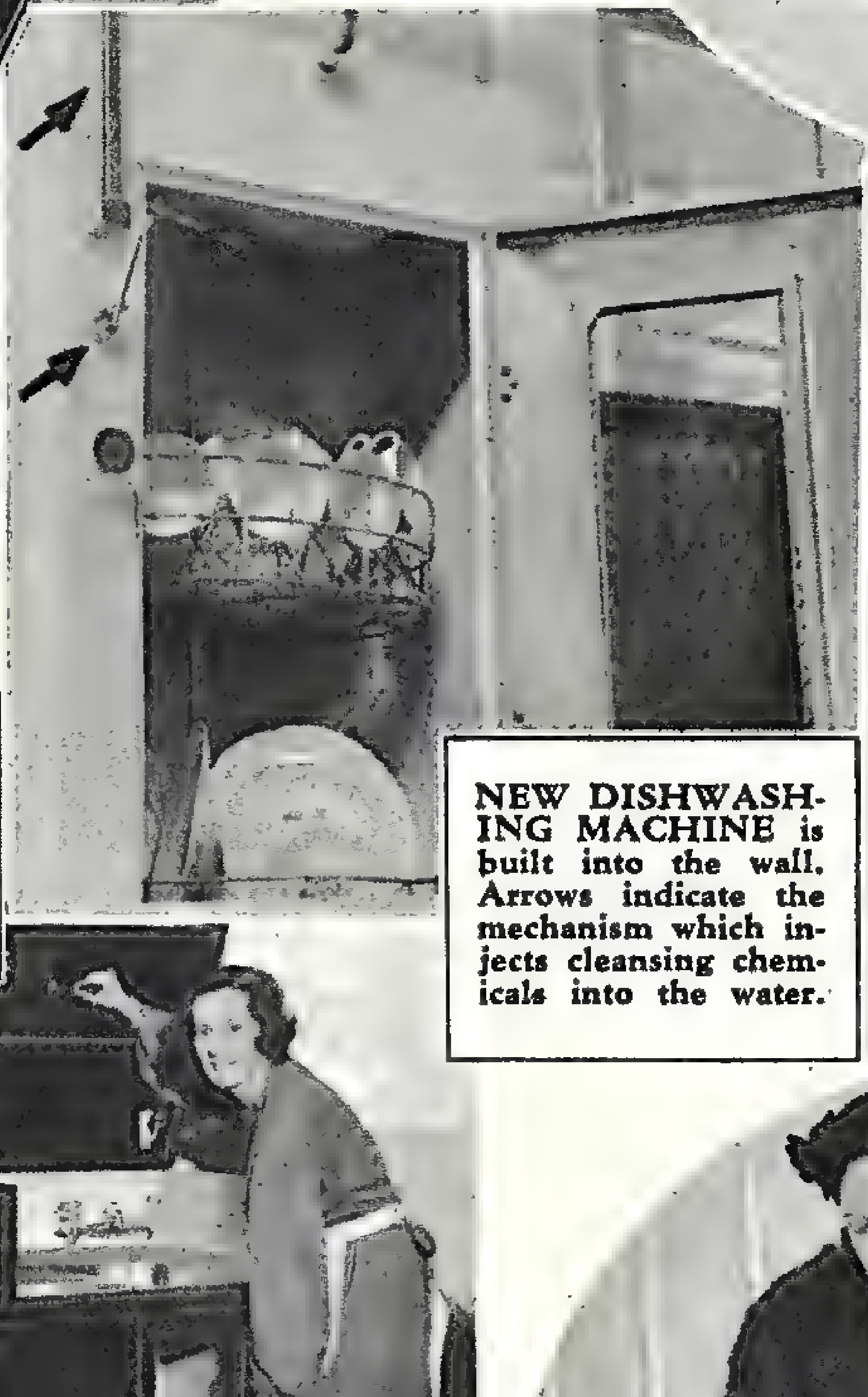
This fire ladder used by the Buenos Aires Fire Department reaches 164 feet into the air. Special jacks are mounted to the base to prevent it from toppling. An inclination dial shows when the ladder has been extended to the limit. At the top, the ladder has been equipped with a jet through which water can be directed to points inaccessible from the ground.

Housewives Welcome New Conveniences

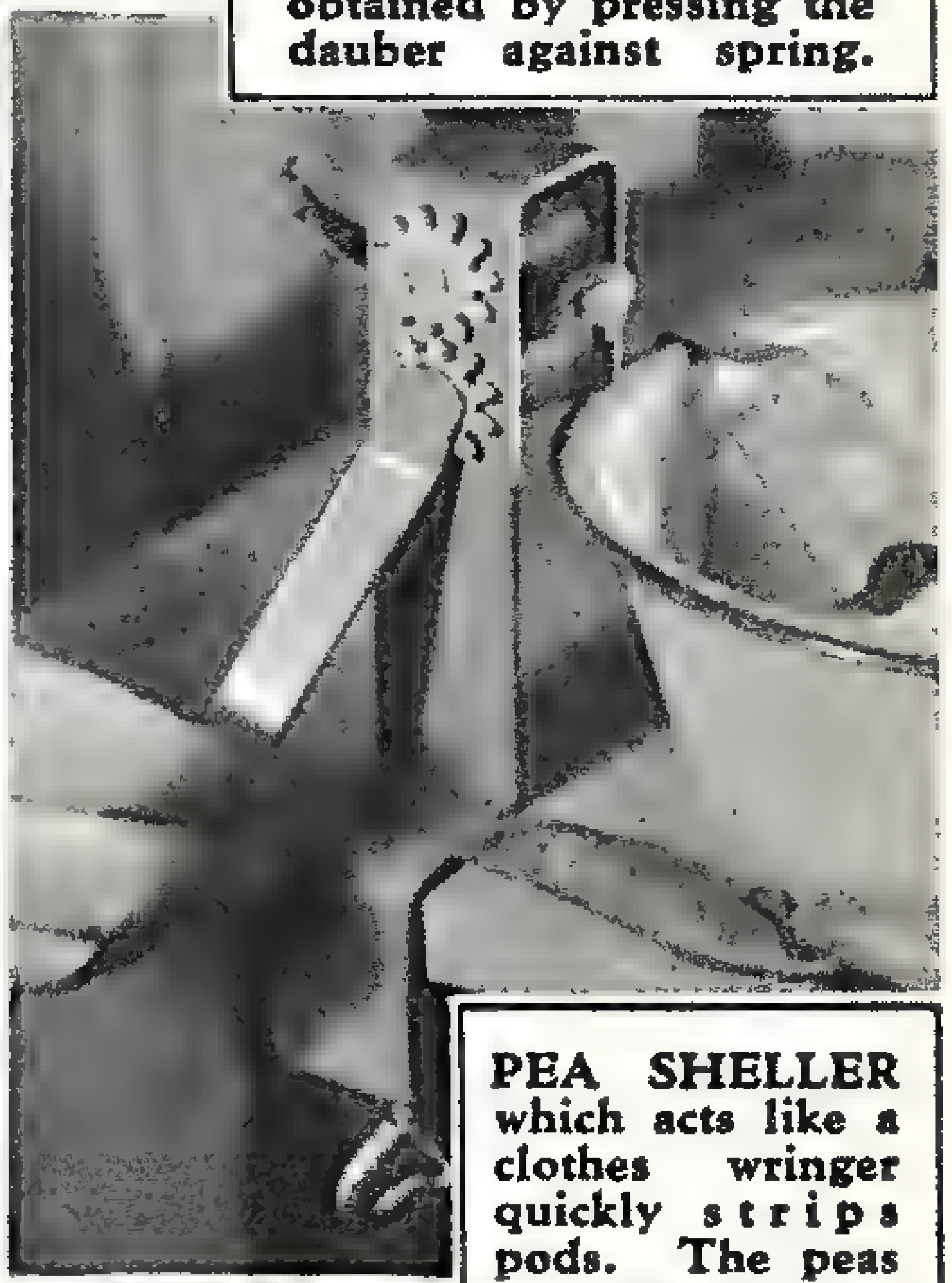
FOOD BOWL LINERS for children make breakfast seem to taste better, as there is a picture and story which cannot be seen until all food has been eaten.

LIQUID SHOE POLISHING container for the home cannot spill even when tipped over. A spring valve seals the bottle. The polish is obtained by pressing the dauber against spring.

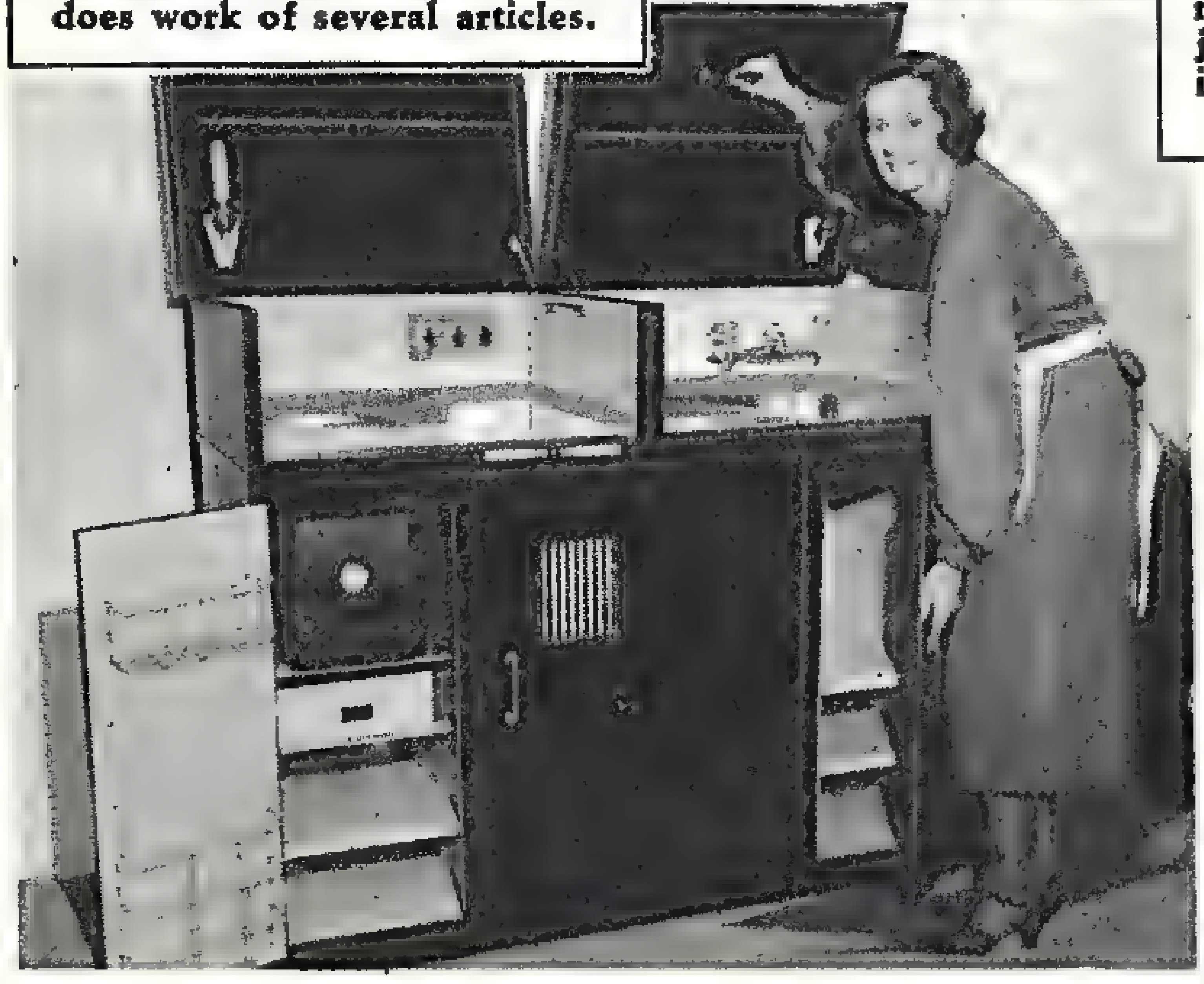
A COMBINATION SHREDDER, mincer, grater and cutter can be used in preparing any type of salad with no need of changing utensils. One utility tool does work of several articles.



NEW DISHWASHING MACHINE is built into the wall. Arrows indicate the mechanism which injects cleansing chemicals into the water.



PEA SHELLER which acts like a clothes wringer quickly strips pods. The peas are inserted between rollers and pressure snaps the pod open.

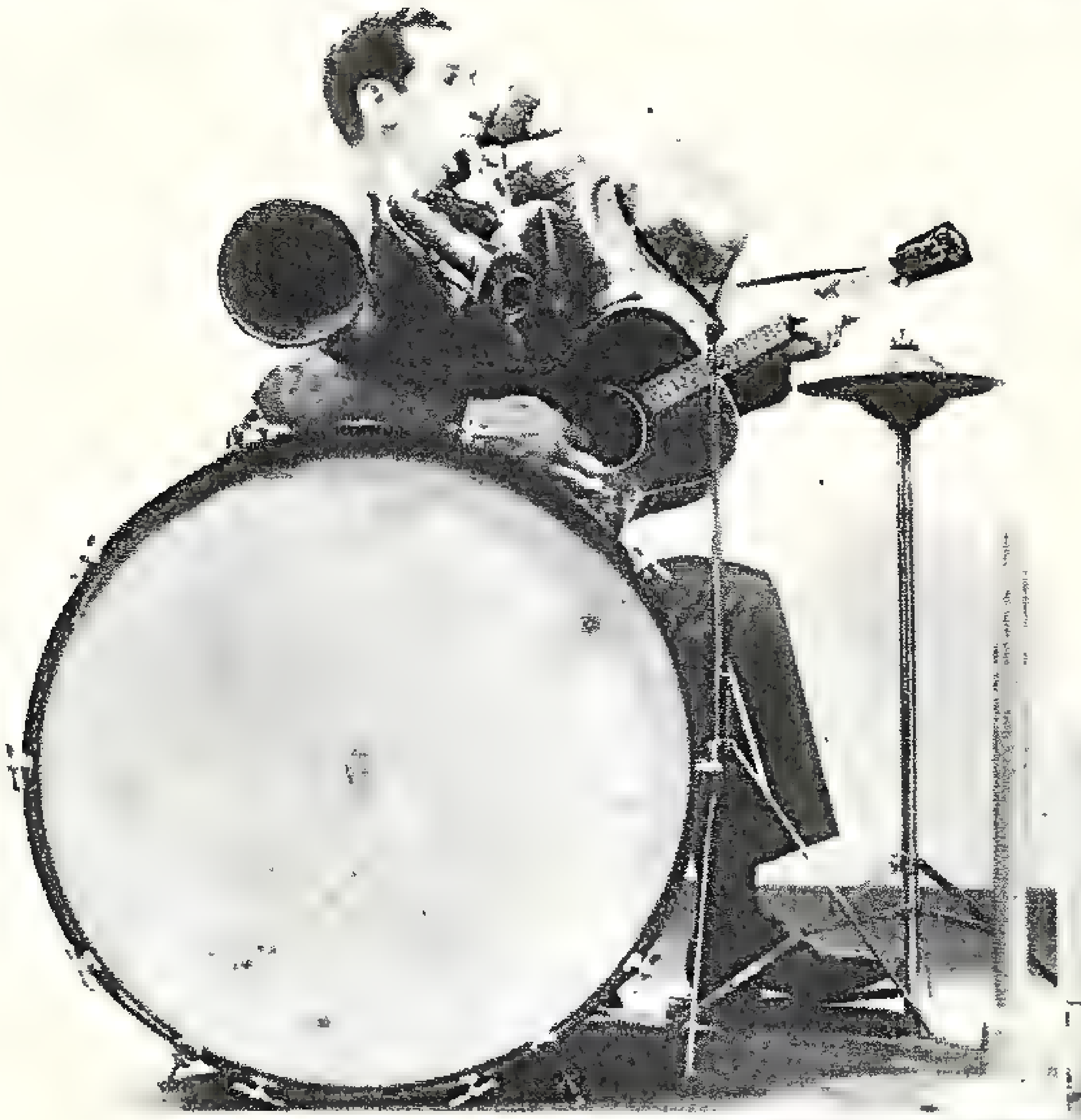


THIS INVISIBLE KITCHEN, when folded, occupies no more room than a standard cabinet. All equipment necessary for cooking, including stove, sink and ice box, are inside.

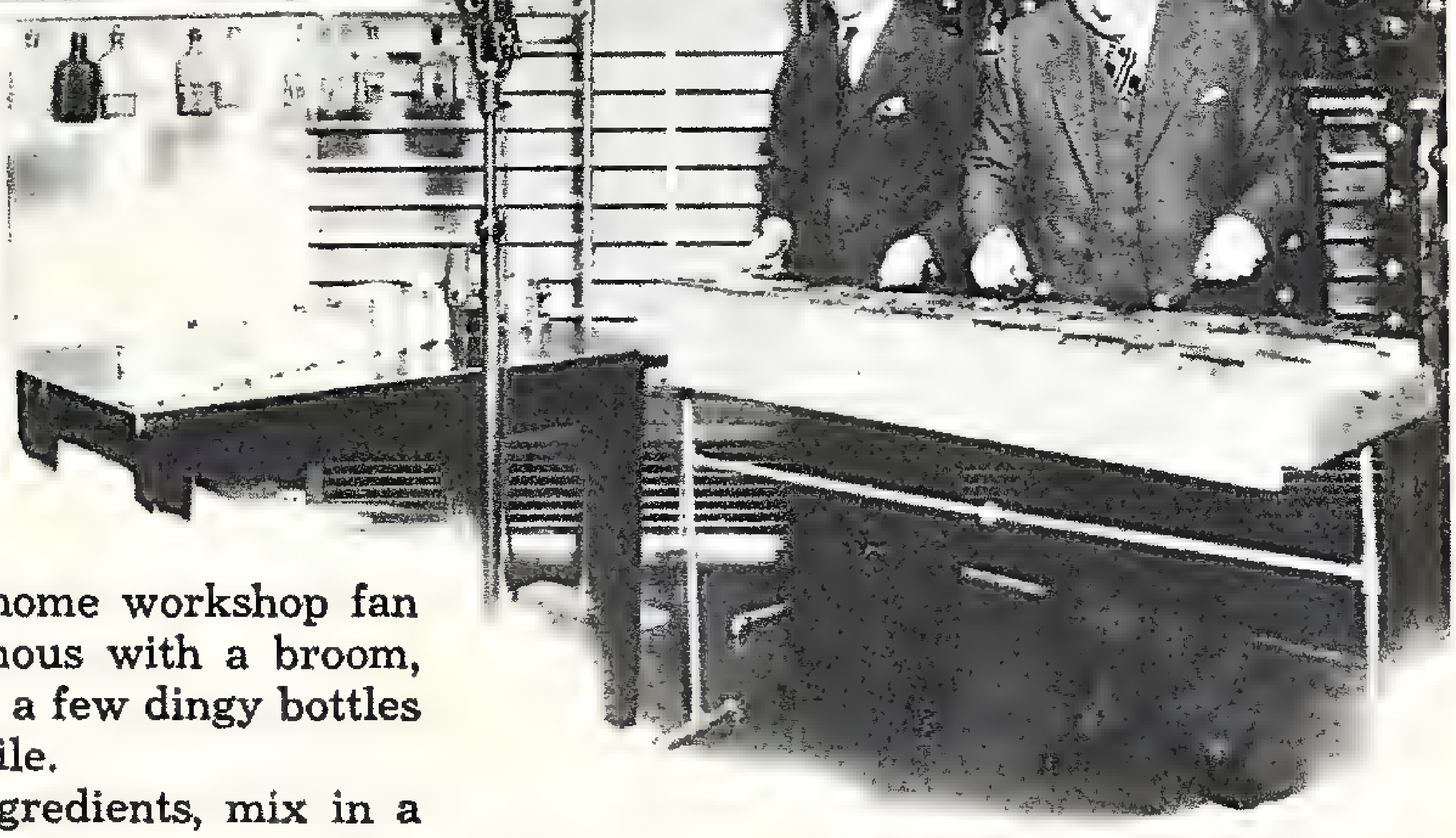
ARM CHAIR DRAWERS are the latest convenience introduced by furniture men. Smokers and readers find them especially desirable.

MUSICAL FREAKS Win Fame

All right, all right! Wire, glass, tin cans—anything. It was all the same to these boys, who made jobs grow from their mechanical ingenuity. This article relates what you didn't hear on the radio.



Just try to arrange all the instruments above so that they will be instantly available to your lips, hands, knees and feet. Vincent Muni did it—made the "music go round and round" the nation to bring him instant fame. But it took mechanical ingenuity, plus the ability to play, to merge the whole into a weekly salary.



Rehearsal found the Major tinkling Jack Sevant's window glass xylophone, with the tincanaphone running second.

IT'S marvelous how a home workshop fan can make himself famous with a broom, a saw, a dozen tin cans or a few dingy bottles picked up from a junk pile.

Take these assorted ingredients, mix in a little inventive genius, and you have the makings of a typical success story as dramatized every week before the nation-wide audience of Major Edward Bowes' famous radio Amateur Hour.

On the Amateur Hour, saws sound like violins, milk bottles like xylophones, and glass tumblers like cellos. Almost any day some workshop musician may emerge with a band saw that sounds like an orchestra, or a drill press as versatile as a pipe organ.

Victor Lundgren is an example of a young man who made good on the Amateur Hour as the inventor of a musical instrument which any home craftsman can duplicate in a few minutes. An ordinary house broom is the backbone of his instrument. He stretched a single wire along the handle, elevating it with a bridge like that used on a violin. For a sound chamber he took an old wooden box about six inches square.

This slides up and down along the broom handle and amplifies the musical notes produced by playing on the single wire with a violin bow.

Steeple Jack Kay's musical invention is even simpler. He plays an ordinary harmonica, the simple music-producer made famous on radio and in the movies by Borrah Minevitch and in his Harmonica Rascals, but he does it with the mouth organ held out of sight behind his head. He does it by remote control through the medium of a two-foot length of rubber tubing. One end of the tube is held in his mouth; the other end delivers

for MAJOR BOWES' Amateurs

lung power to the proper openings in the harmonica.

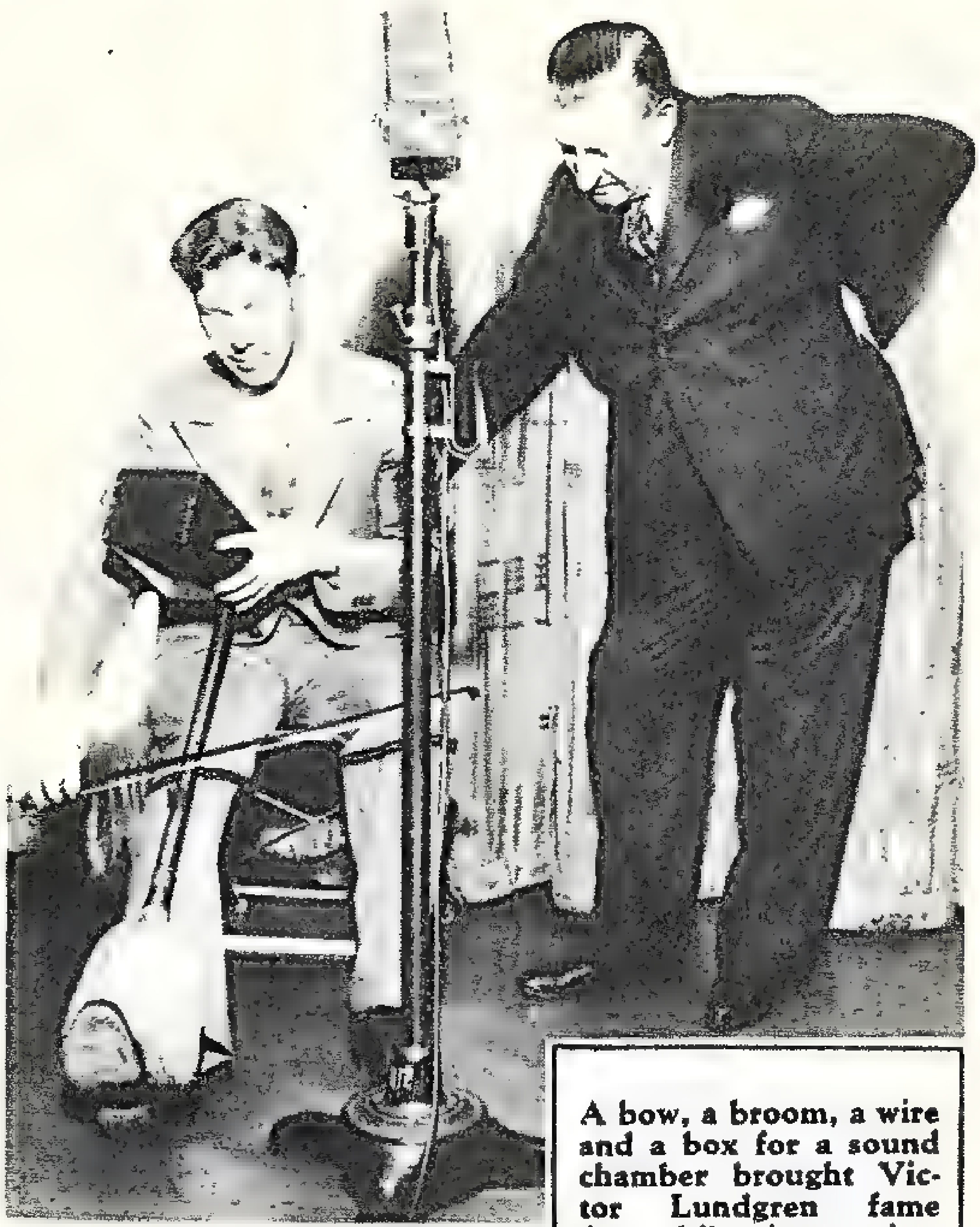
Somewhat more complicated are the inventions of Jack Sevant, who is practically a symphony orchestra all by himself, with no less than four novelty instruments to his credit. He was employed as a sweeper in a factory until he made such a hit on the Amateur Hour that he was signed as a member of a Major Bowes traveling unit which tours the theatres of the country.

His musical bottles look like a drug store window display, except that they hang by their necks from a crossbar. They are arranged in graduated tones, like the keys of a piano. The bottles are tuned by filling them with varying amounts of water, and are tightly corked to prevent evaporation. When tapped with small hammers, bell-like tones are produced. A cotton string is tied behind the row of bottles, touching them and dampening the after-vibrations like the soft pedal of a piano.

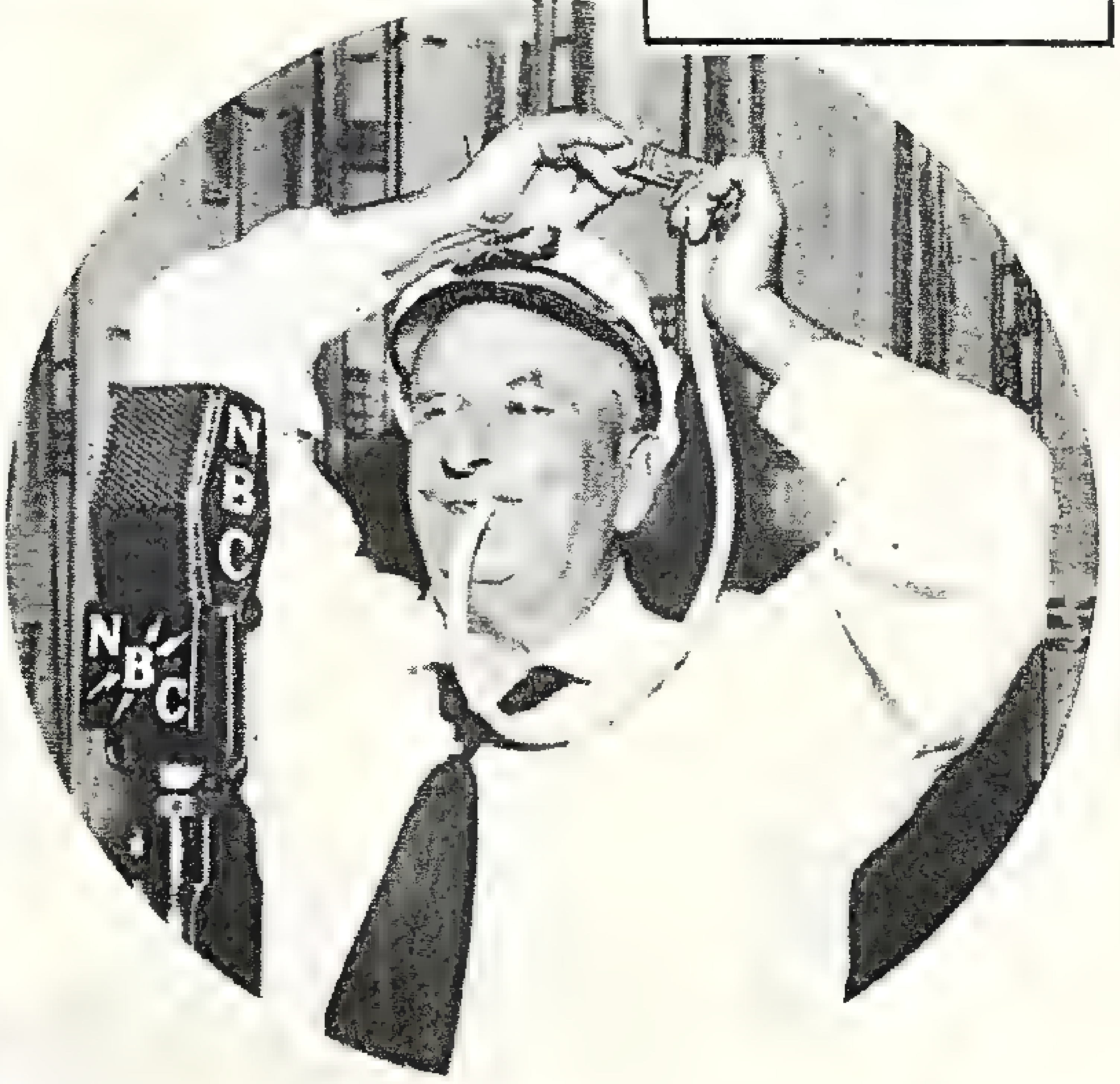
Similar in principle is Mr. Sevant's "tincanophone," in which cans are used instead of bottles. He even leaves the labels on, and thus A sharp may be tomato soup and High C sliced pineapple. The labels cannot be taken too seriously, however, for the food contents are removed from the cans and they are tuned in much the same way as the bottles.

Window glass takes the place of customary metal

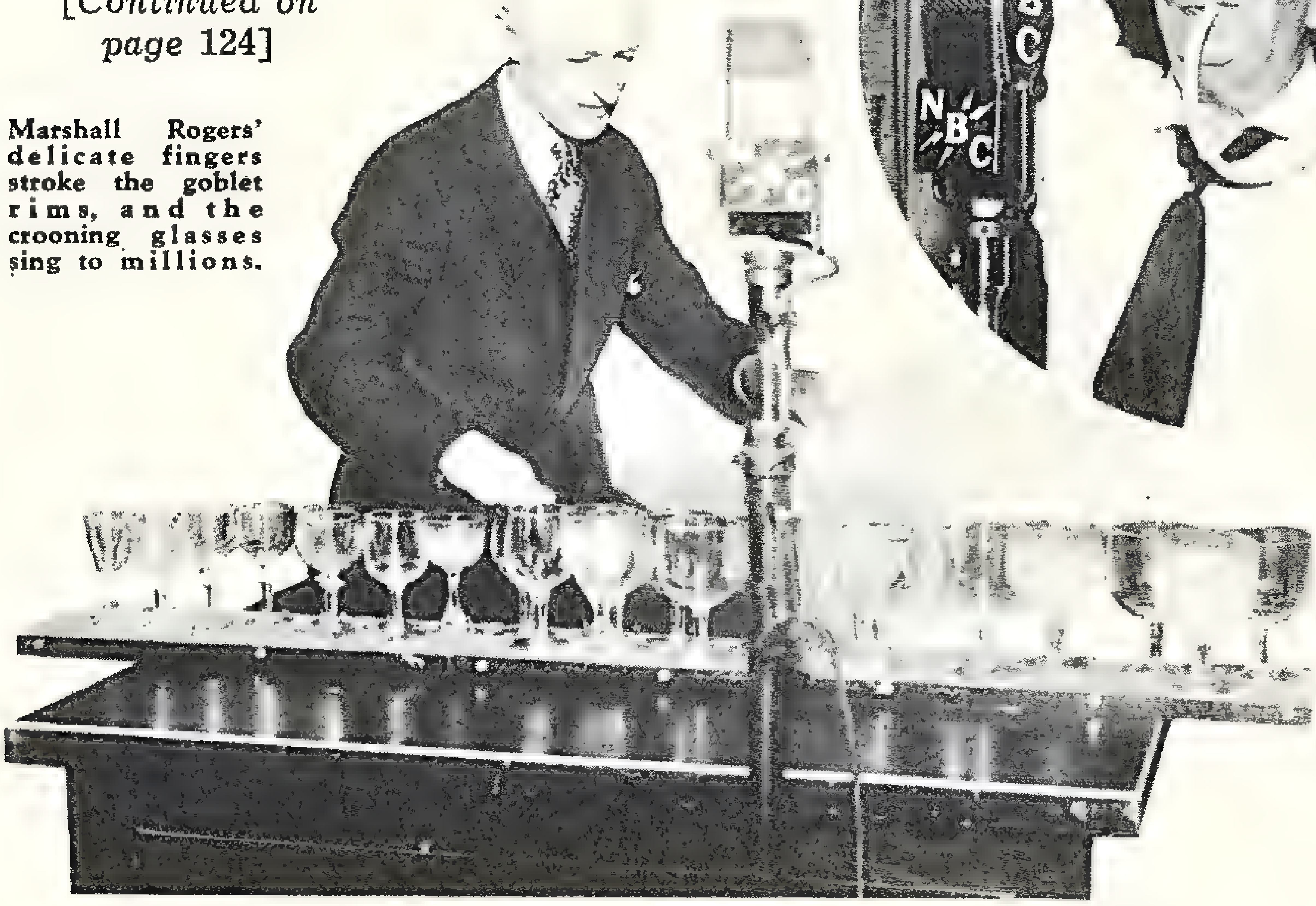
[*Continued on page* 124]



A bow, a broom, a wire and a box for a sound chamber brought Victor Lundgren fame for his ingenuity.



If the flagpoles Steeple Jack Kay painted were laid end to end, they wouldn't reach half so far as did his remote control type of harmonica playing when the Major put him on the air to win plaudits for his utterly unique style in piped music. He doesn't paint flagpoles now



Marshall Rogers' delicate fingers stroke the goblet rims, and the crooning glasses sing to millions.

Crack Freight Comes In With the Morning's Milk Supply

This iron horse hauls a fast freight to give west coast towns the benefit of early morning deliveries. Christened the "Overnight," the name describes its speedy running time.

Mystery Plane Aims At New Record

A NEW mystery plane with a cruising speed of 200 miles an hour is being groomed by the French for a trans-Atlantic hop from Paris to New York and return in 40 hours. Built by the Cauldron works, the plane is now undergoing extensive tests under the watchful eye of the famous pilot, Captain Rossi. Rossi hopes to make the crossing in 16 hours and after a rest of 8 hours to return to France in 16 hours. The mystery plane, 1936 edition, is a far cry from the monoplane flown across the English Channel by Rossi's compatriot, Bleriot, in 1917.

Here is the secretly built French plane which hopes to span the Atlantic in 40 hours and return. Powered with Renault motors, the ship has a cruising speed of 200 miles an hour.

TRUCKS and modern science have combined with the freight train to provide merchants between San Francisco and Los Angeles with overnight delivery service over the 450-mile route.

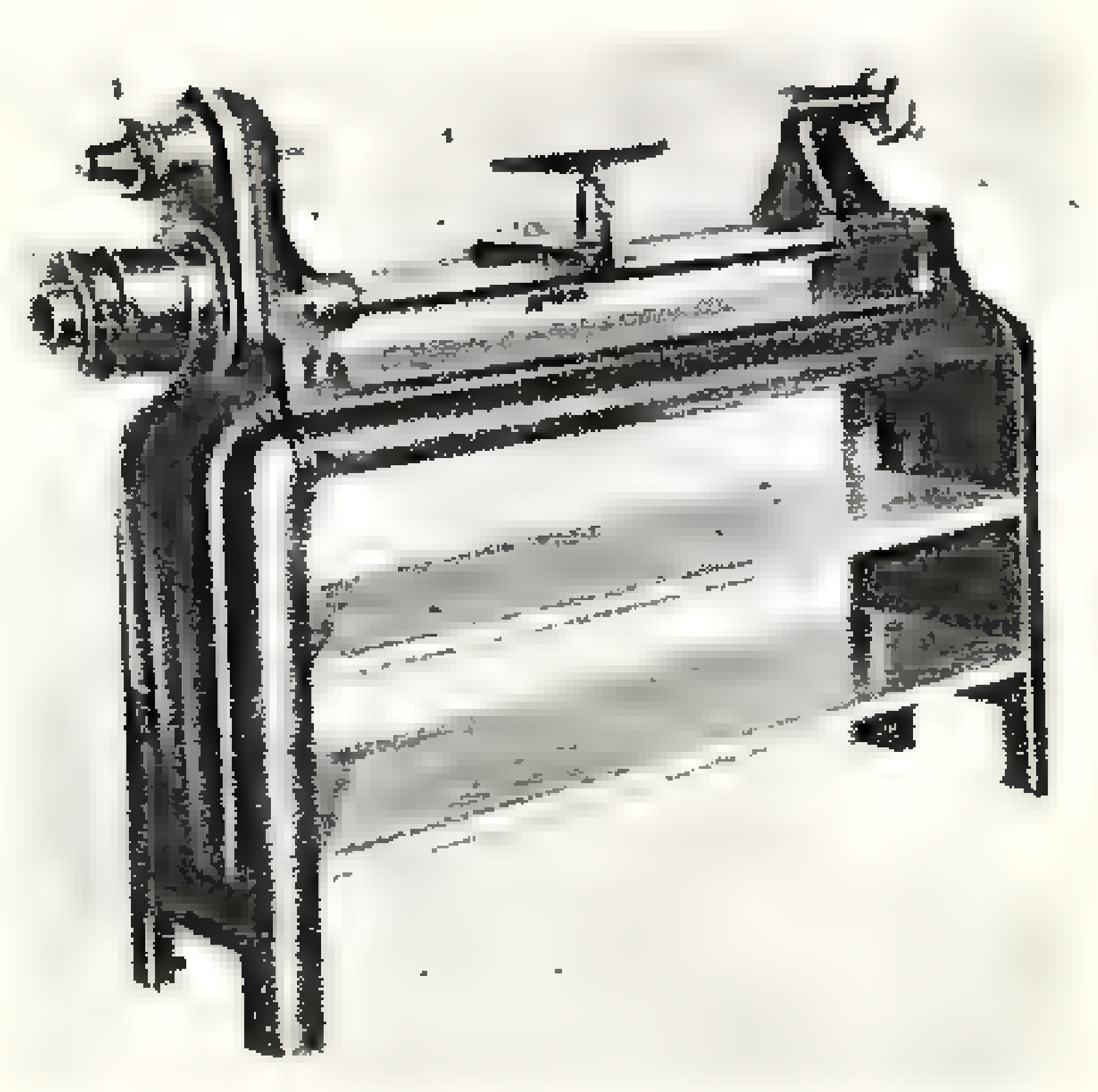
The fast freight, christened the Overnight, makes but four stops between the two cities. Fleets of trucks, working in close cooperation with the train, scour the intermediary points, picking up freight and making deliveries. So tight is the schedule that multiplex printers, operating at 60 words per minute, are needed to telegraph the way bills ahead.

Not only do milk distributors in California's key cities get their produce before daybreak, but a full day is clipped from the Los Angeles-Reno schedule. It is expected that other freight routes soon will be speeded up.

Lathe Combines Beauty With Utility

POINTING the way to a new trend in machine design, a new precision-built lathe combines beauty of line, rigid construction and freedom from vibration. It can be run at any speed desired.

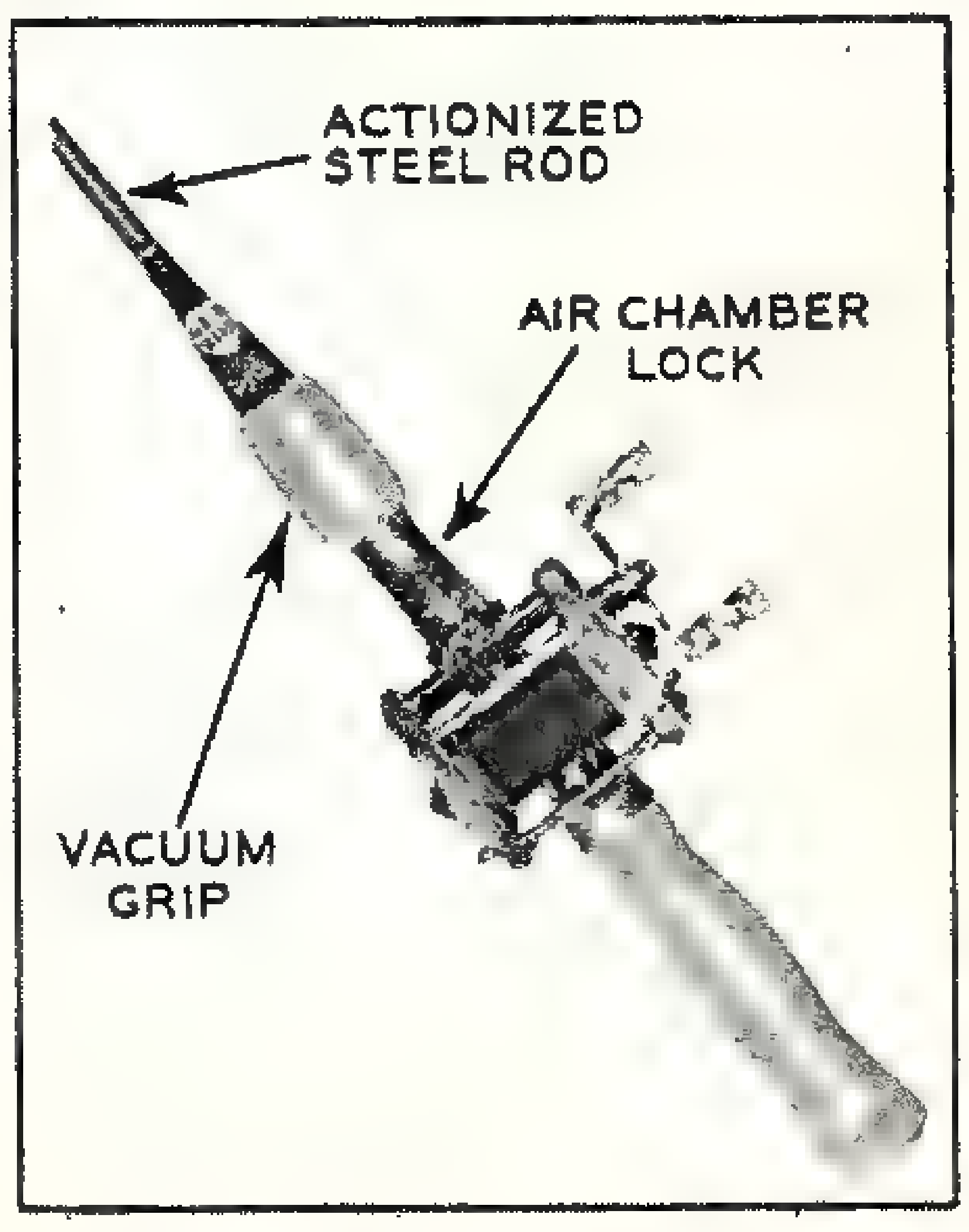
In addition, the lathe is adaptable for bench or pedestal mounting.



This precision-built lathe combines freedom from vibration with beauty of line, safety, and rigid construction. Note shelf-space.

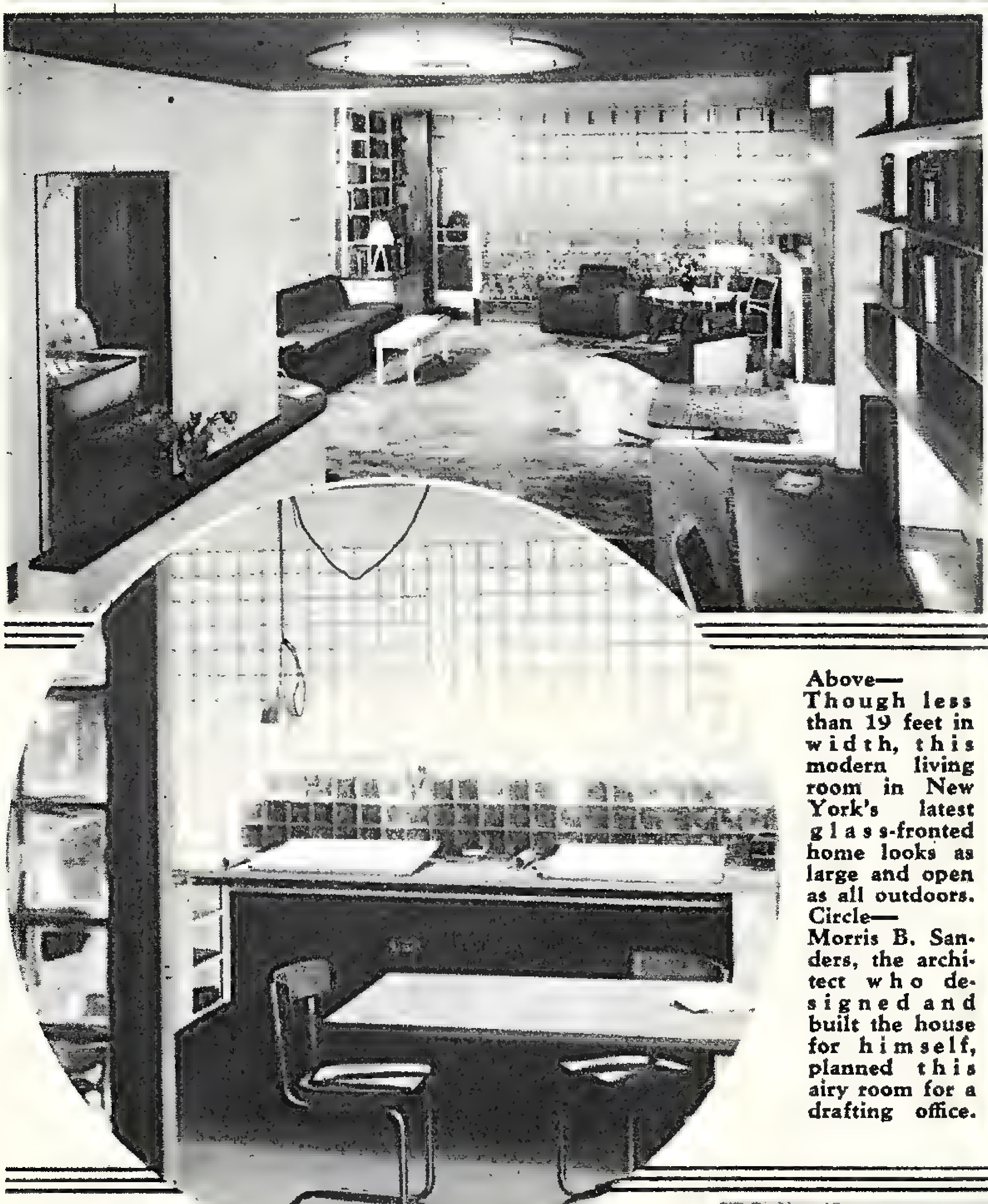
New Rod and Grip Aid Fisherman

TODAY'S Anglers are slated for a new deal, judging by the latest innovations, an "actionized" steel rod and a new type streamline vacuum grip. The vacuum grip is obtained by a tapered cowling housing an air-chamber which grips the rod.

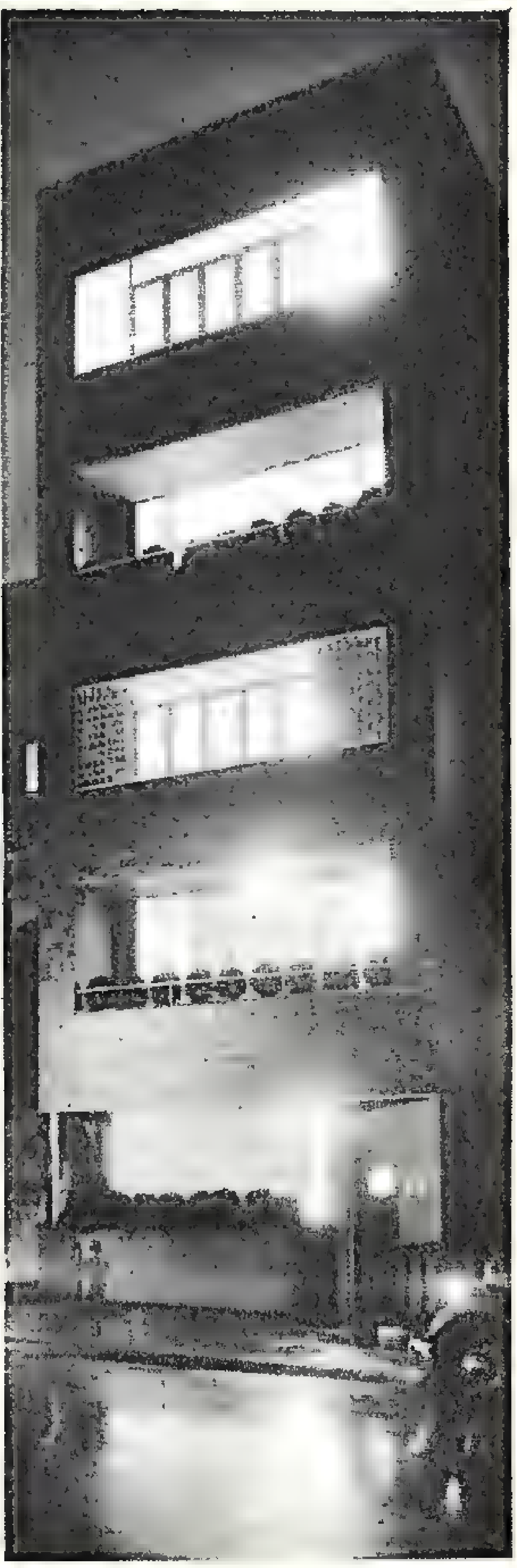


Izaak Walton would welcome this new steel fishing rod with a special grip which keeps it in position.

Architect Builds Modern GLASS HOME



Above—Though less than 19 feet in width, this modern living room in New York's latest glass-fronted home looks as large and open as all outdoors. Circle—Morris B. Sanders, the architect who designed and built the house for himself, planned this airy room for a drafting office.



Top, right—A night view of the glass house. The glass blocks permit light to shine through, but screen the interior from persons on the street. Above—A neat lounging room on an upper floor. Rooms are all sound proof, dust proof and air conditioned. Metal furniture adds to spaciousness.

THE open spaciousness of a country manor, captured in a 5-story house but 19 feet wide and set in the heart of crowded New York City is the latest architectural miracle to be wrought by the use of glass blocks.

From the outside the narrow structure, designed and built by Morris B. Sanders, architect, is impressively beautiful. Inside all idea of confinement is lost. Through a clever method of arranging the furniture close to the wall an illusion of space is created which is further heightened by the perspective-destroying glass walls. The rooms seem to extend indefinitely.

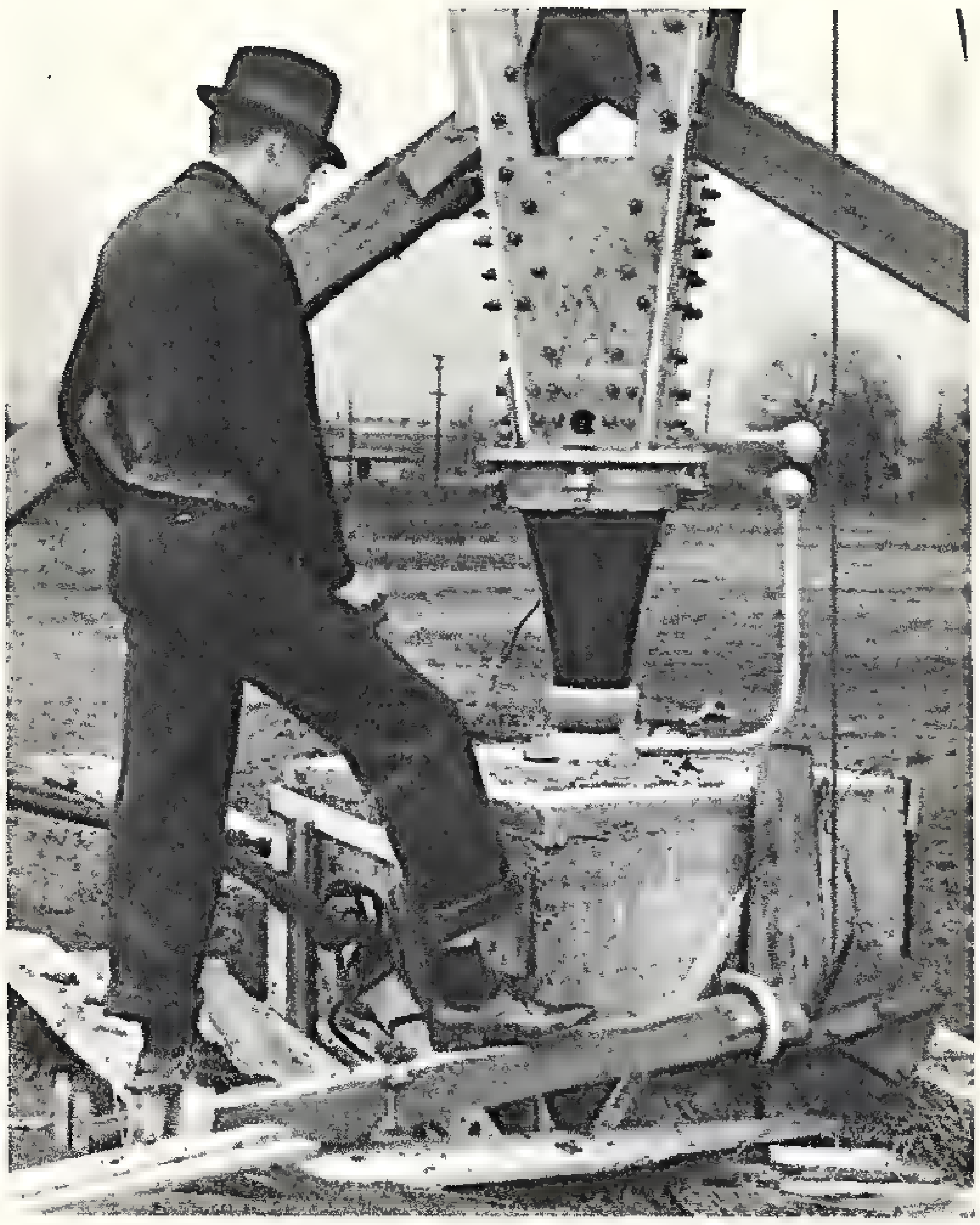
Recessed shelves, bookcases, and cupboards add to the roominess of the interior. In many cases metal furniture was used.

Small Porcelain Base Supports 390-Foot Radio Tower

A PORCELAIN base 6 inches in diameter and 18 inches high supports a single radio tower 6 feet square and 390 feet high at the north end of St. Louis, Mo. The tower, one of several in the United States, has been erected for Station KWK in St. Louis near the Mississippi river at a site offering the most efficient ground effect.

Made of channel iron, the lofty tower has a dead weight of 20 tons and with its four guy wires exerts a total pressure on its porcelain base of 120 tons. It is calculated that the base can bear an added strain of 80 tons.

Severe pull on the guy wires requires that they be fastened to a cement standard sunk 10 feet into the ground. The wires are connected with the tower at a point 211 feet from the ground. The Arthur A. Zeis Erecting Co., of St. Louis, constructed the tower.



This porcelain base supports an iron radio tower reaching 390 feet into the air. The base is 6 inches in diameter and only 18 inches long. Total pressure on porcelain base is 120 tons.

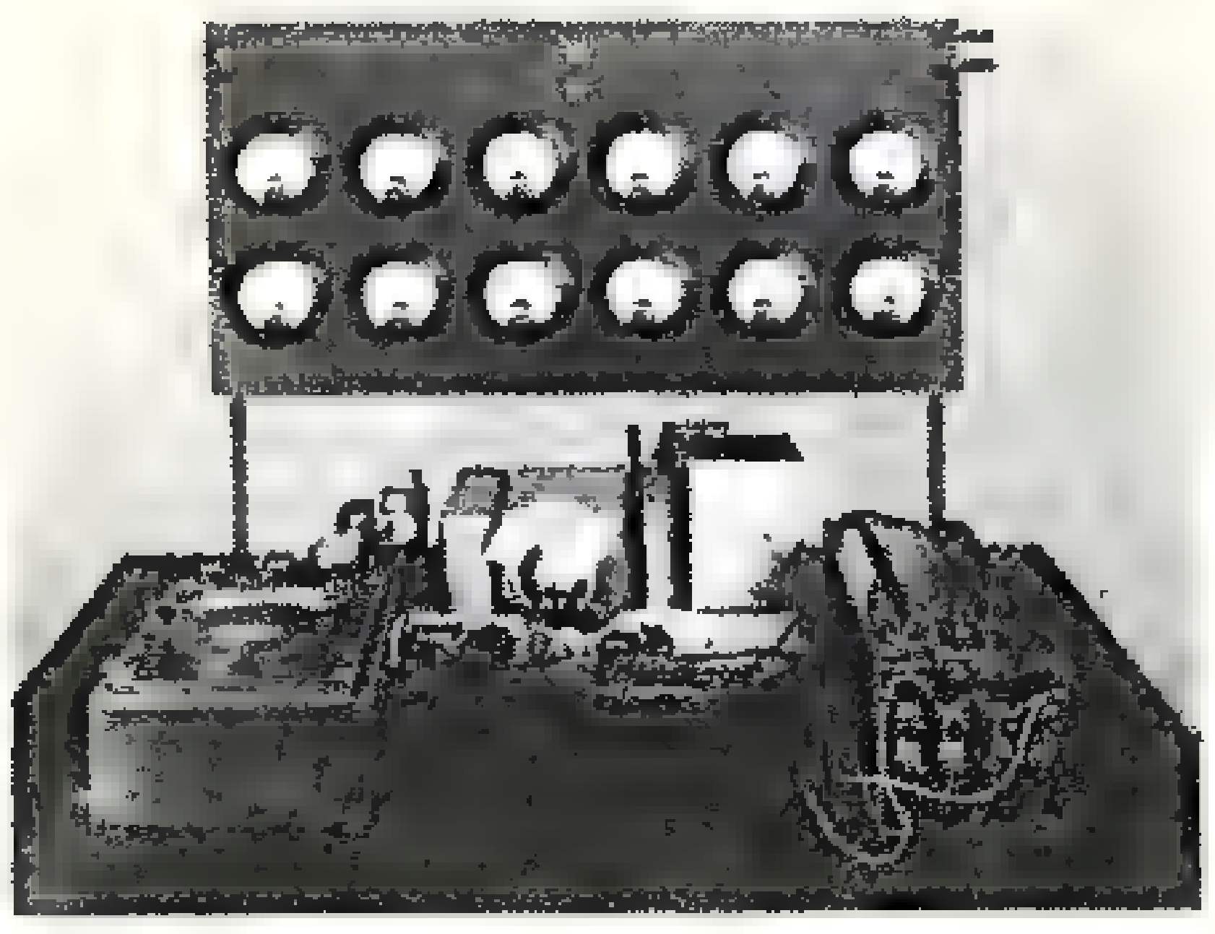
Automatic Glass Washer Patented

AN AUTOMATIC glass washer has been patented by two Wisconsin inventors. The apparatus instantly washes glassware inside and out.

This automatic glass washer comprises an upright nozzle over which a vessel is placed. Downward pressure opens a valve and releases outer and inner water sprays.

Robot Listeners Check Broadcasts

A GROUP of six "listeners" to Station WOR haven't missed a single broadcast note or syllable in six months. The "listeners" consists of six decibel meters which follow each rise and fall of signal volume at high speed. They are part of a study of the advantages of this "high speed" type of decibel meter in checking broadcast signal characteristics. Operated by a fixed frequency receiver turned on last June, and kept in constant operation since, meters spring into action with WOR's signal.



These radio "listeners" have checked every note broadcast by Station WOR in the last 6 months.

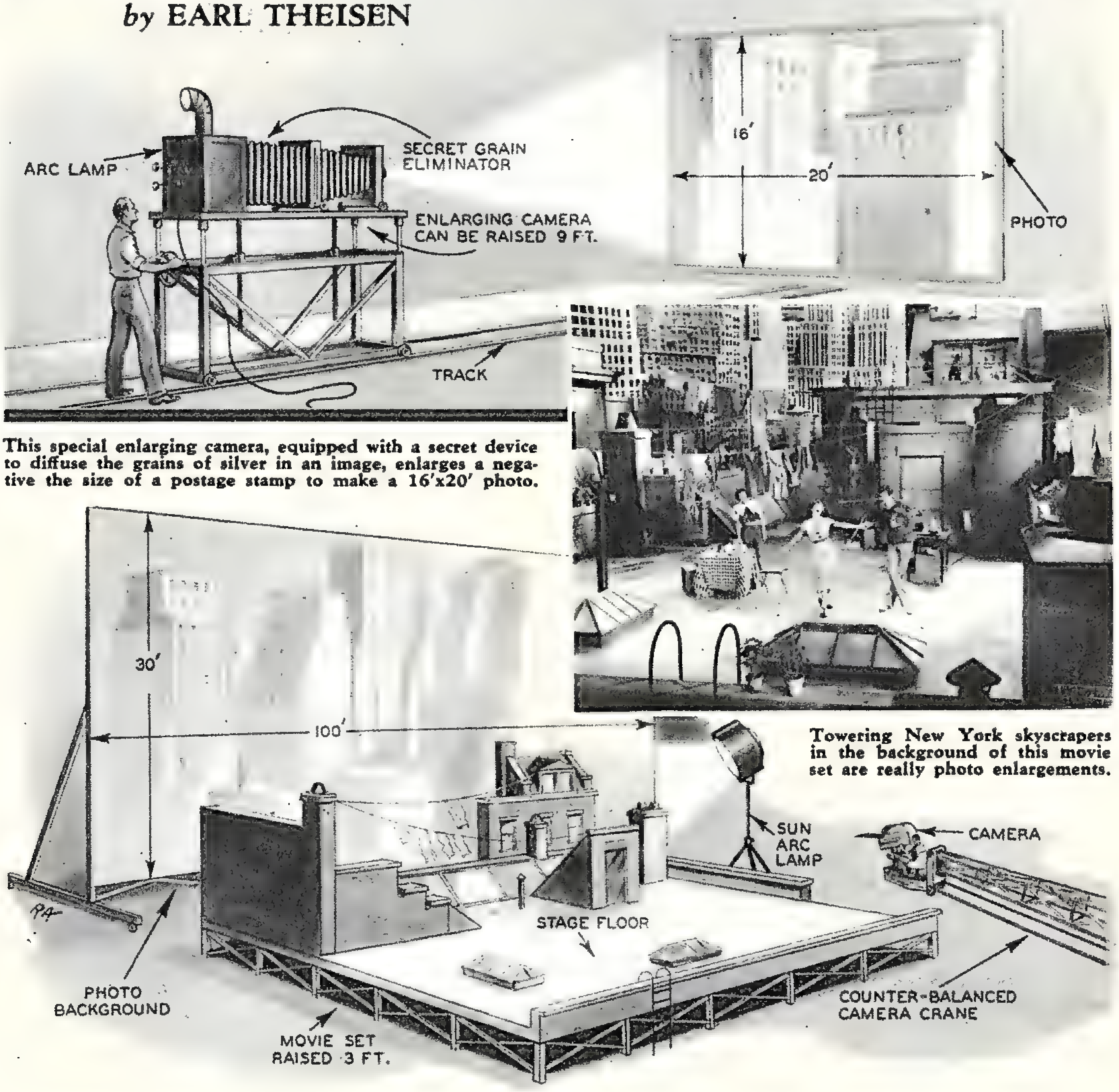
Dash Lamp Warns of Light Failure

A LIGHT failure indicator which promptly informs the driver when one or more lights on his car are failing is now being manufactured by a California concern. By means of an inexpensive relay system the failing light turns on a small warning bulb on the dash panel.

The small lamp indicated by arrow is automatically turned on when a headlight burns out.

Making the World's Largest PHOTOGRAPHS

by EARL THEISEN


ARC LAMP
SECRET GRAIN ELIMINATOR
ENLARGING CAMERA CAN BE RAISED 9 FT.
TRACK
16'
20'
PHOTO
30'
100'
SUN ARC LAMP
CAMERA
STAGE FLOOR
PHOTO BACKGROUND
MOVIE SET RAISED 3 FT.
COUNTER-BALANCED CAMERA CRANE

This special enlarging camera, equipped with a secret device to diffuse the grains of silver in an image, enlarges a negative the size of a postage stamp to make a 16'x20' photo.

Towering New York skyscrapers in the background of this movie set are really photo enlargements.

Here is the stage setting for the above photo, taken during the filming of "Broadway Melody of 1936." This inside set is used in preference to a real one because technicians can better control sound, light, and camera angles. To take above photo, for instance, the cameraman would have to be perched dangerously over an alley, a strain on himself and actors.

VISUALIZE a photograph about as long as the average city block, and as tall as a telephone pole, and you will have some idea of the enlargements being used in moving pictures. The largest photograph ever made by Pacific Studios, who specialize in this type of work, was 180 feet in length and 30 feet high, and showed the skyline of New York.

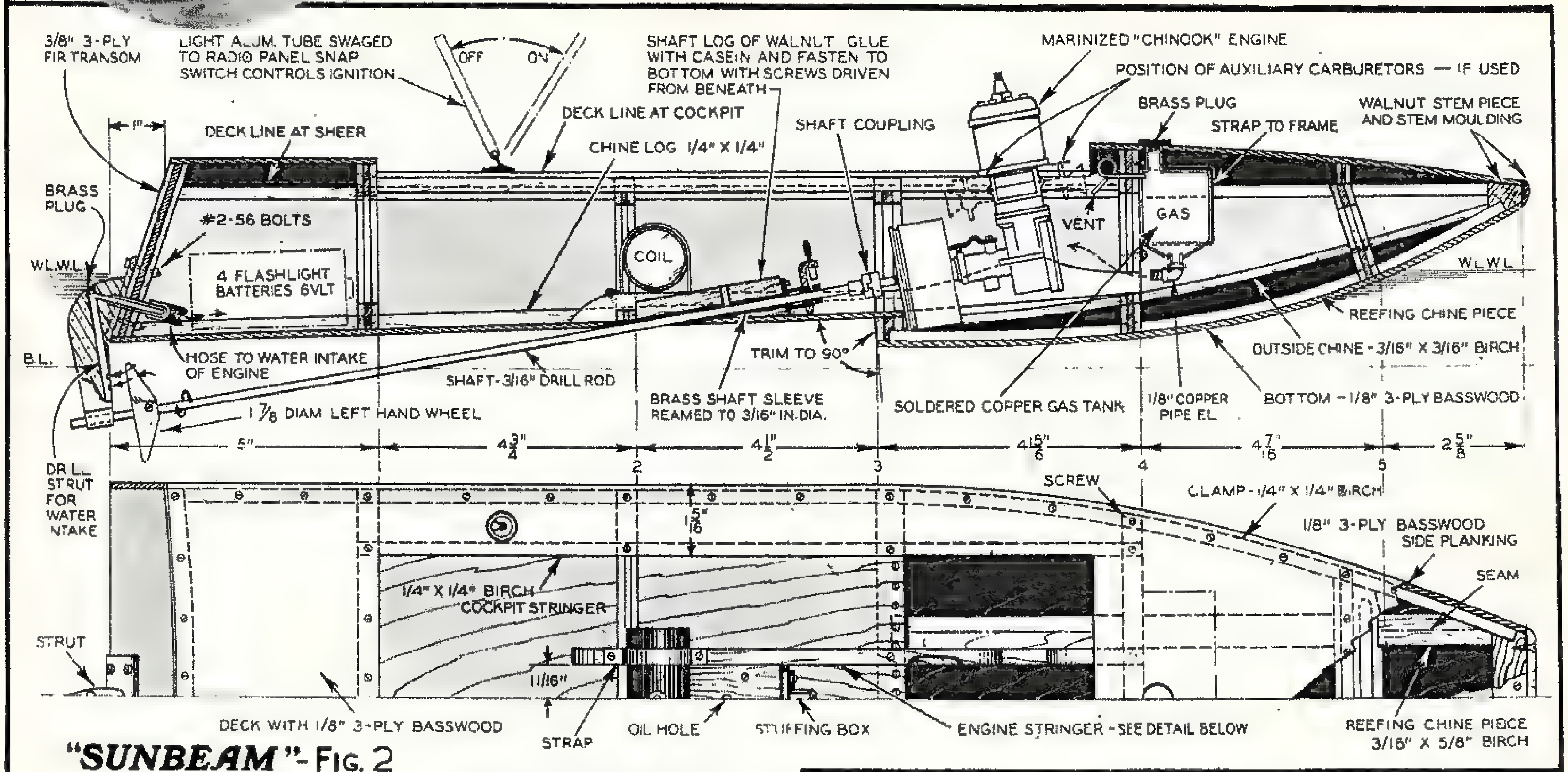
The views through windows of tall buildings, foreign scenes, or mountain and forest panoramas are in most instances photo enlargements made to serve as atmospheric backgrounds. They are mounted on wheels and rolled into any desired position.

The great pictures are made on a specially woven canvas, coated with a light-sensitive bromide emulsion, and anchored to an easel to receive the photographic impression. The pictures are developed by the roller method.

Often story requirements demand that there be trees where there are no trees, or a new skyscraper on the skyline. Then the new is grafted onto the old, and the manipulations cannot be detected on the screen.

"SUNBEAM"—a

by WESTON FARMER


3/8" 3-PLY FIR TRANSOM
LIGHT ALUM. TUBE SWAGED TO RADIO PANEL SNAP SWITCH CONTROLS IGNITION
OFF
ON
SHAFT LOG OF WALNUT GLUE WITH CASEIN AND FASTEN TO BOTTOM WITH SCREWS DRIVEN FROM BENEATH
MARINIZED "CHINOOK" ENGINE
POSITION OF AUXILIARY CARBURETORS — IF USED
BRASS PLUG
STRAP TO FRAME
WALNUT STEM PIECE AND STEM MOULDING
1"
DECK LINE AT SHEER
DECK LINE AT COCKPIT
CHINE LOG 1/4" X 1/4"
SHAFT COUPLING
BRASS PLUG
#2-56 BOLTS
VENT
GAS
COIL
W.L.W.L.
4 FLASHLIGHT BATTERIES 6VLT
W.L.W.L.
REEFING CHINE PIECE
B.L.
HOSE TO WATER INTAKE OF ENGINE
TRIM TO 90°
OUTSIDE CHINE - 3/16" X 3/16" BIRCH
SHAFT-3/16" DRILL ROD
BRASS SHAFT SLEEVE REAMED TO 3/16" IN.DIA.
SOLDERED COPPER GAS TANK
1/8" COPPER PIPE EL
BOTTOM - 1/8" 3-PLY BASSWOOD
1 7/8 DIAM LEFT HAND WHEEL
5"
4 3/4"
4 1/2"
4 15/16"
4 7/16"
2 5/8"
2
3
4
5
DRILL STRUT FOR WATER INTAKE
SCREW
CLAMP - 1/4" X 1/4" BIRCH
1 5/16"
1/8" 3-PLY BASSWOOD SIDE PLANKING
SEAM
1/4" X 1/4" BIRCH COCKPIT STRINGER
STRUT
11/16"
DECK WITH 1/8" 3-PLY BASSWOOD
STRAP
OIL HOLE
STUFFING BOX
ENGINE STRINGER - SEE DETAIL BELOW
REEFING CHINE PIECE 3/16" X 5/8" BIRCH

"SUNBEAM"-Fig. 2

SCALE IN INCHES
0 1 2 3 4 5 6

NOTE-ALL FRAMES 3/8" PLYWOOD EXCEPT AT STEP FRAME WHICH IS OF 1/2" PLYWOOD.. USE 1/2"# 3 FLAT HD BRASS OR COPPER SCREWS THRUOUT

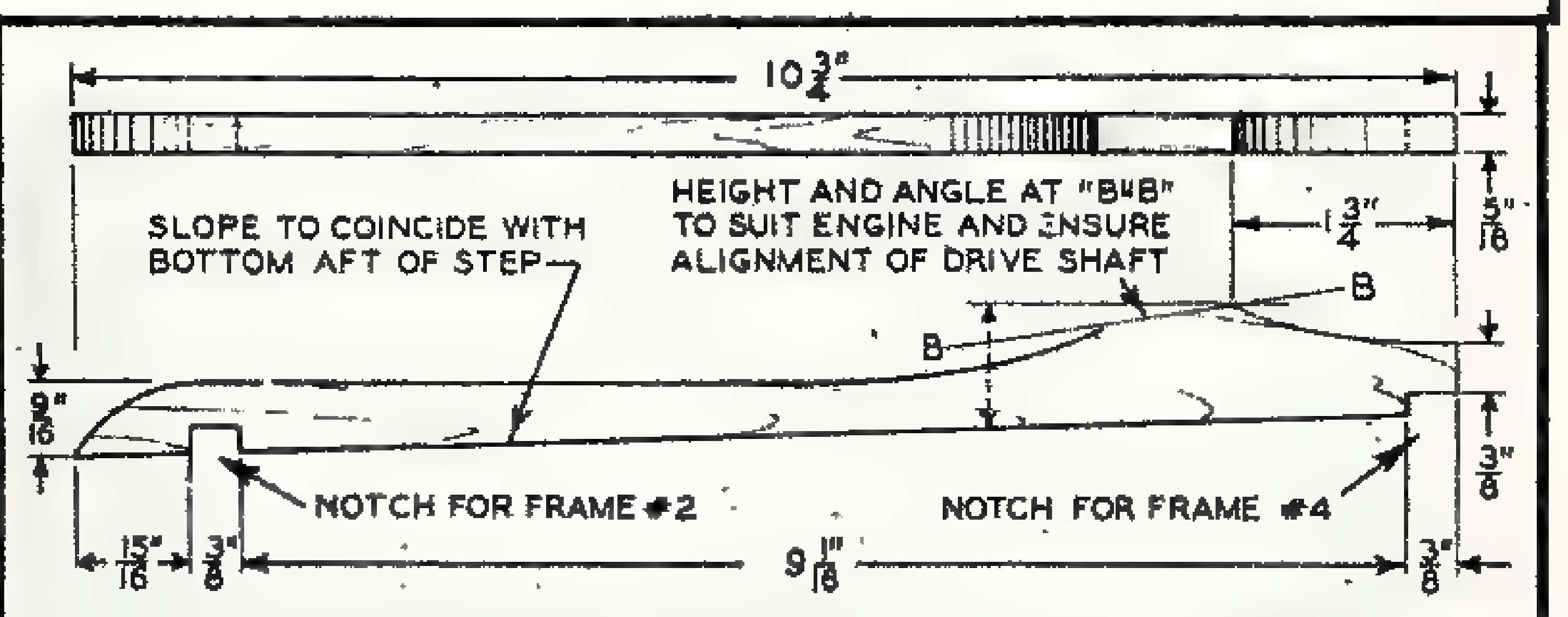

10 3/4"
5/16"
1 3/4"
SLOPE TO COINCIDE WITH BOTTOM AFT OF STEP
HEIGHT AND ANGLE AT "B"B" TO SUIT ENGINE AND ENSURE ALIGNMENT OF DRIVE SHAFT
B
B
9/16"
3/8"
NOTCH FOR FRAME #2
NOTCH FOR FRAME #4
15/16"
3/8"
9 1/16"
3/8"

FIG. 2-A-MAKE 2 ENGINE STRINGERS OF BIRCH TO SUIT ENGINE USED

In building "Sunbeam" follow the plans carefully paying close attention to the various dimensions. The above cross section diagram clearly shows the arrangement of the hull as well as the location of miniature engine and ignition system.

NOTHING affords more pleasure than to see a model hydroplane, built by your own hands go skimming through the water in a most realistic manner. Powered by "Chinook," the miniature gasoline engine described in the May issue of MODERN MECHANIX & INVENTIONS, "Sunbeam," as the model raceboat has been named, is the last word in model marine craft.

The construction of the hull is not at all difficult as one will learn after examining the detailed plans. Birch and 3-ply basswood are used to form stringers, frames and incidental parts.

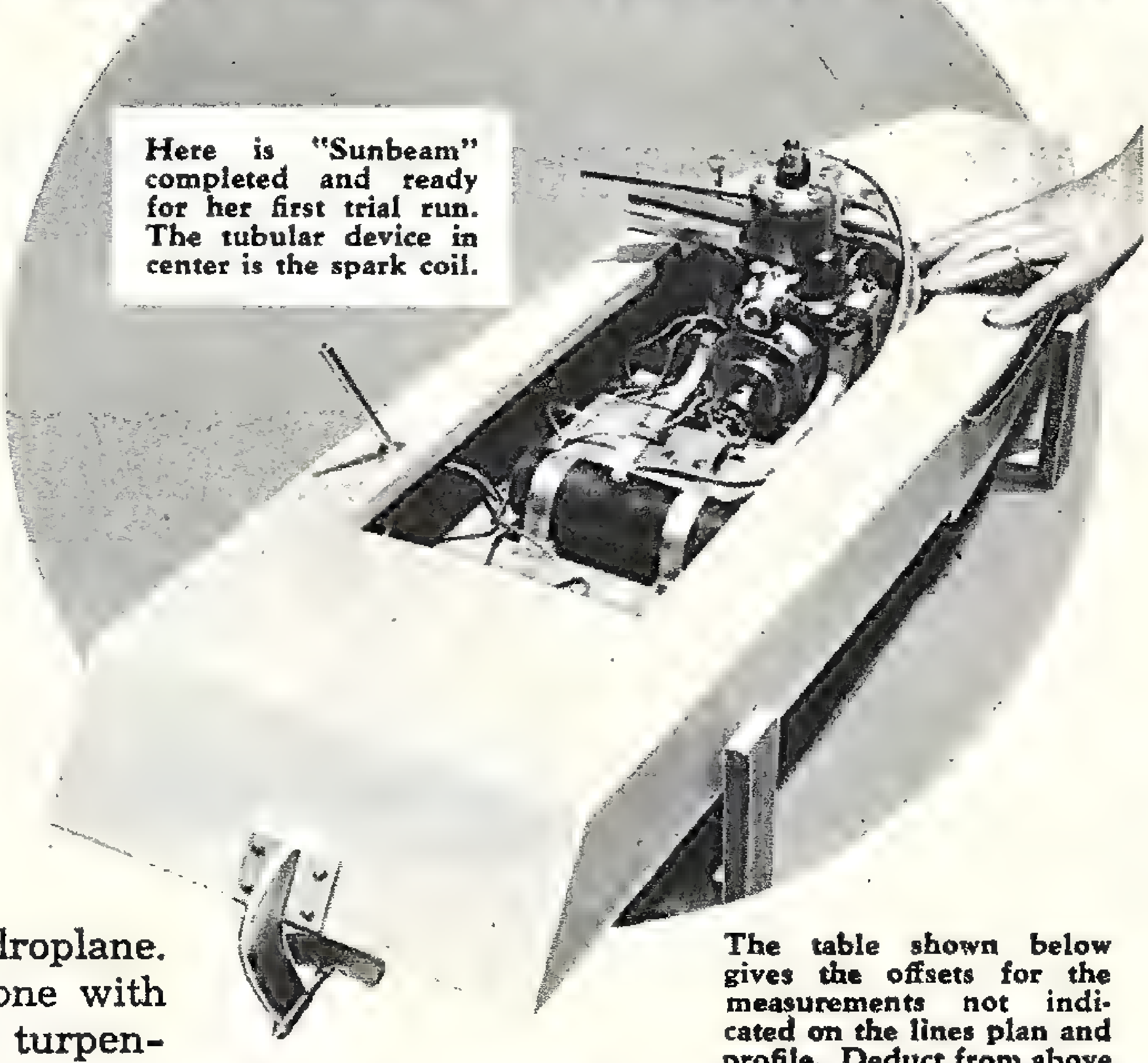
To begin actual construction first reproduce the lines drawing full size on a drawing board, then draw out the patterns for the frames, deducting 1/8" all around for the 1/8" plywood basswood planking which is used. A keel pattern board must be cut out to space the frames and to keep them aligned while you are screwing on the side planks. Line the keel pattern board up on the drawing board as shown in the sketch, Fig. 1, and the frames are then put in as progressively shown. The transom is solid, of course, and is beveled for the proper rake before being temporarily fastened by brads to the keel pattern board. Attach the walnut nose piece to the keel pattern board, which can be of 3/4" scrub stock, and then put in the sheer clamps and the chine logs. The construction of the frame at the step has been made clear in the drawings. Use 3/8" No. 3 flathead brass screws for the planking, or 1/2" size if screwing into end grain in the plywood frames.

The sides are attached to the chine log and sheer clamp with screws spaced about 1¼" on centers. Thick casein glue is also used in attaching the sides to the clamp and chine. Being waterproof it will prevent leaks.

Next the bottom aft is put on. This is a simple operation, but it might be wise to state that all the holes for the screws must first be

Flashing MODEL Raceboat

Powered with the MM "Chinook" this model hydroplane offers model fans new thrills.



Here is "Sunbeam" completed and ready for her first trial run. The tubular device in center is the spark coil.

drilled with a root diameter drill to a depth of ¼" in order to prevent splitting. Countersink the screw heads flush with a rosette.

The crown is cut into the aft formers. Forward, separate crown formers must be made and as these will take some fitting and beveling to get them right, they should be made as separate pieces, later to be glued. A former is used to determine the proper crown for the hydroplane.

Painting of the hull should be done with priming coats of half boiled oil and turpentine. When dry, sand, and apply synthetic auto enamel in colors desired. The original "Sunbeam," as shown in photos, was painted a buff cream.

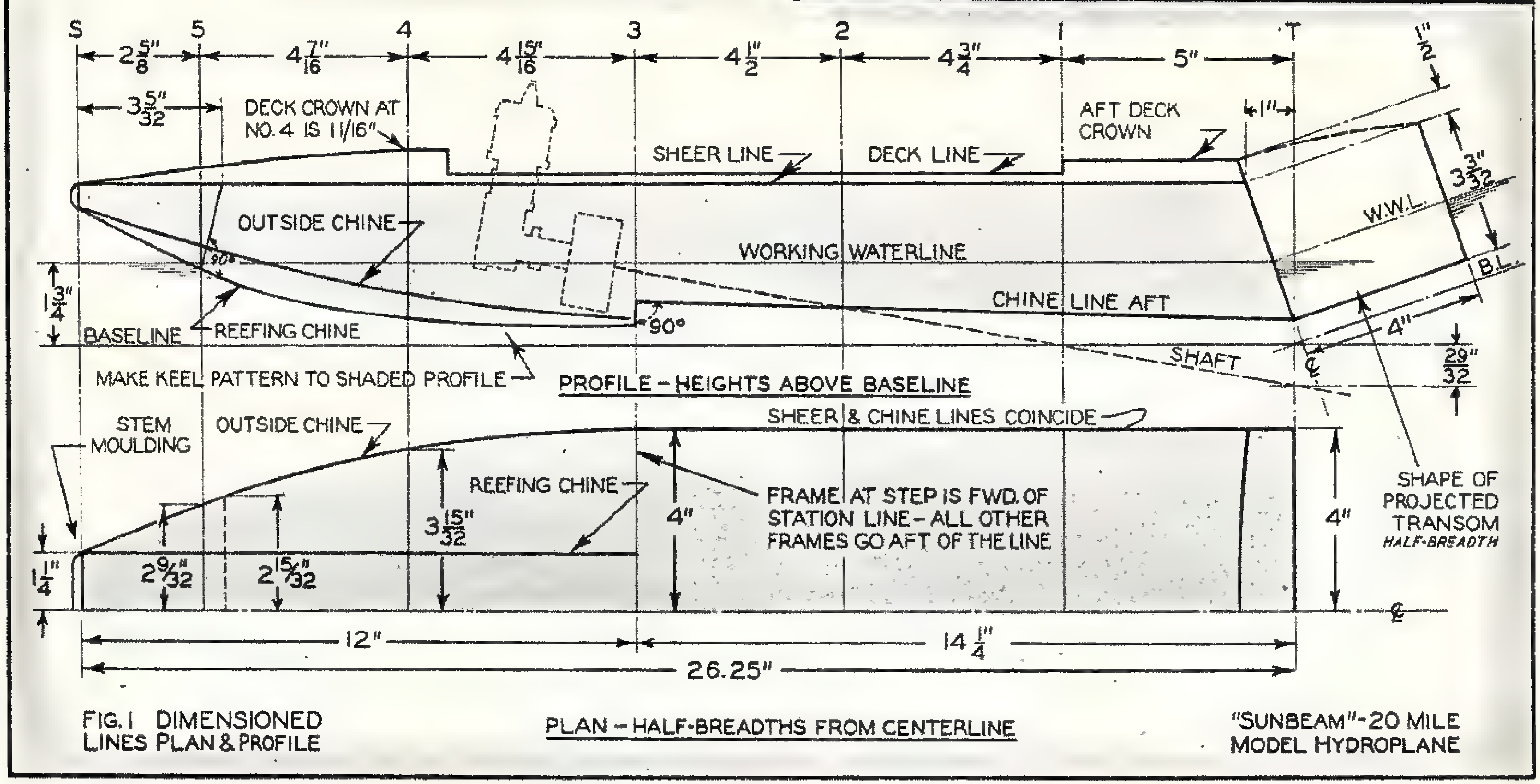
While construction of hull is quite simple some explanation as to "Sunbeam's" operation is in order. First, you will notice that the boat has no rudder. Since it is operated from a central stake or tethering boat moored in

The table shown below gives the offsets for the measurements not indicated on the lines plan and profile. Deduct from above dimensions for planking.

TABLE OF OFFSETS FOR DIMENSIONS NOT SHOWN ON LINES PLAN — OFFSETS TO OUTSIDE OF PLANKING

FRAME NO. →	TRANSOM	3	4	5	STEM
AFT CHINE	1/2"	29/32"			
OUTSIDE CHINE		1/2	1 3/32	2 3/32	2 15/16"
REEFING CHINE		3/8"	17/32"	1 19/32"	2 15/16
SHEER LINE	3 7/16	3 7/16	3 7/16	3 7/16	3 7/16

NOTE: HEIGHTS ABOVE BASELINE: DEDUCT FOR PLANKING



S
5
4
3
2
1
T
2 5/8"
4 7/16"
4 15/16"
4 1/2"
4 3/4"
5"
1/2"
3 5/32"
DECK CROWN AT NO. 4 IS 11/16"
AFT DECK CROWN
1"
SHEER LINE
DECK LINE
3 3/32"
W.W.L.
OUTSIDE CHINE
90°
WORKING WATERLINE
B.L.
1 3/4"
CHINE LINE AFT
BASELINE
REEFING CHINE
90°
4"
SHAFT
℄
29/32"
MAKE KEEL PATTERN TO SHADED PROFILE
PROFILE – HEIGHTS ABOVE BASELINE
STEM MOULDING
OUTSIDE CHINE
SHEER & CHINE LINES COINCIDE
REEFING CHINE
3 15/32"
4"
FRAME AT STEP IS FWD. OF STATION LINE – ALL OTHER FRAMES GO AFT OF THE LINE
4"
SHAPE OF PROJECTED TRANSOM HALF-BREADTH
1 1/4"
2 9/32"
2 15/32"
℄
12"
14 1/4"
26.25"
PLAN – HALF-BREADTHS FROM CENTERLINE
"SUNBEAM"–20 MILE MODEL HYDROPLANE

FIG. 1 DIMENSIONED LINES PLAN & PROFILE

The lines drawing should be reproduced full size on drawing paper according to the above measurements before starting any actual construction. Note that the placement of frame at step is forward of the station line while all other frames are aft.

Lay Out Plans To Full Size Before Building

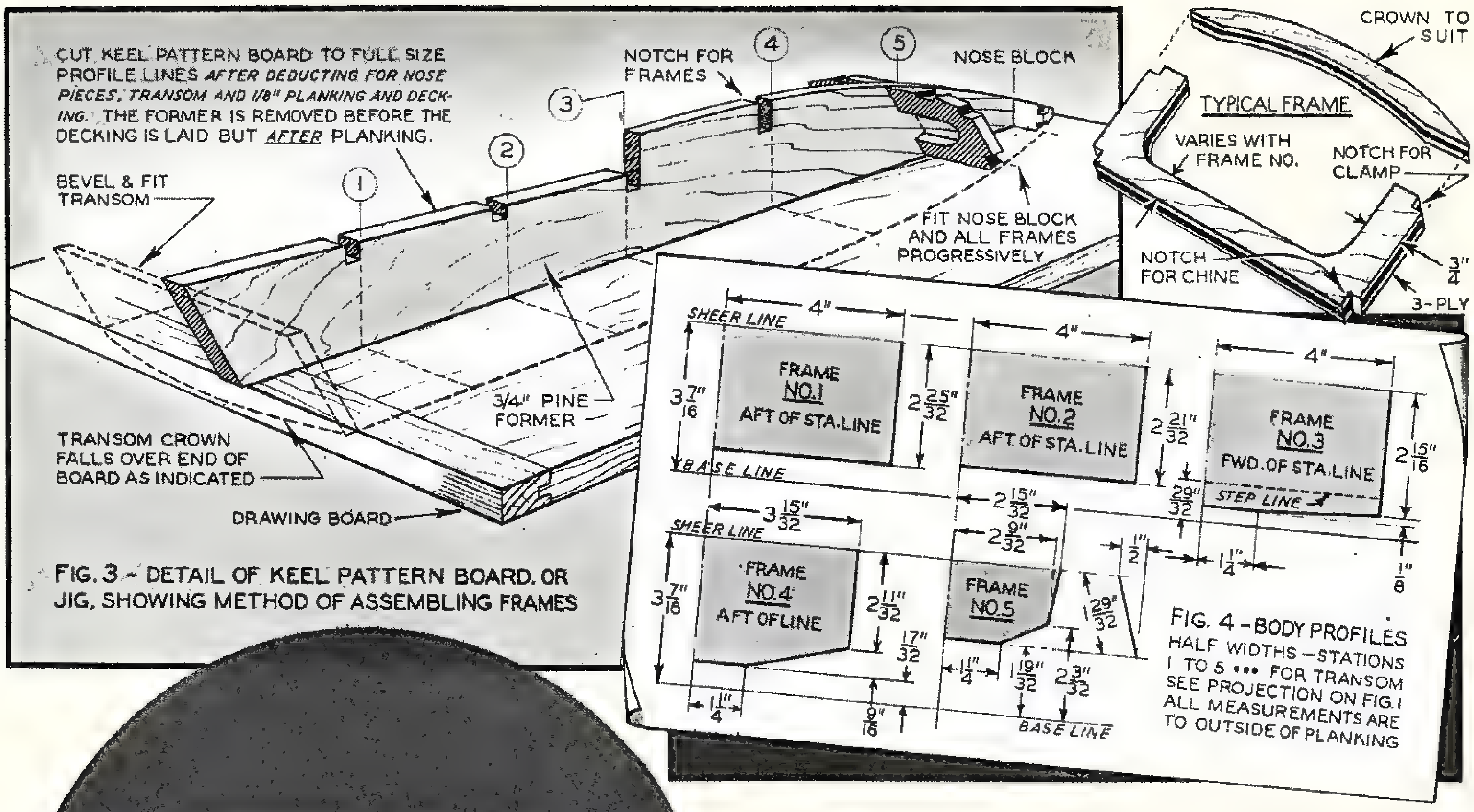
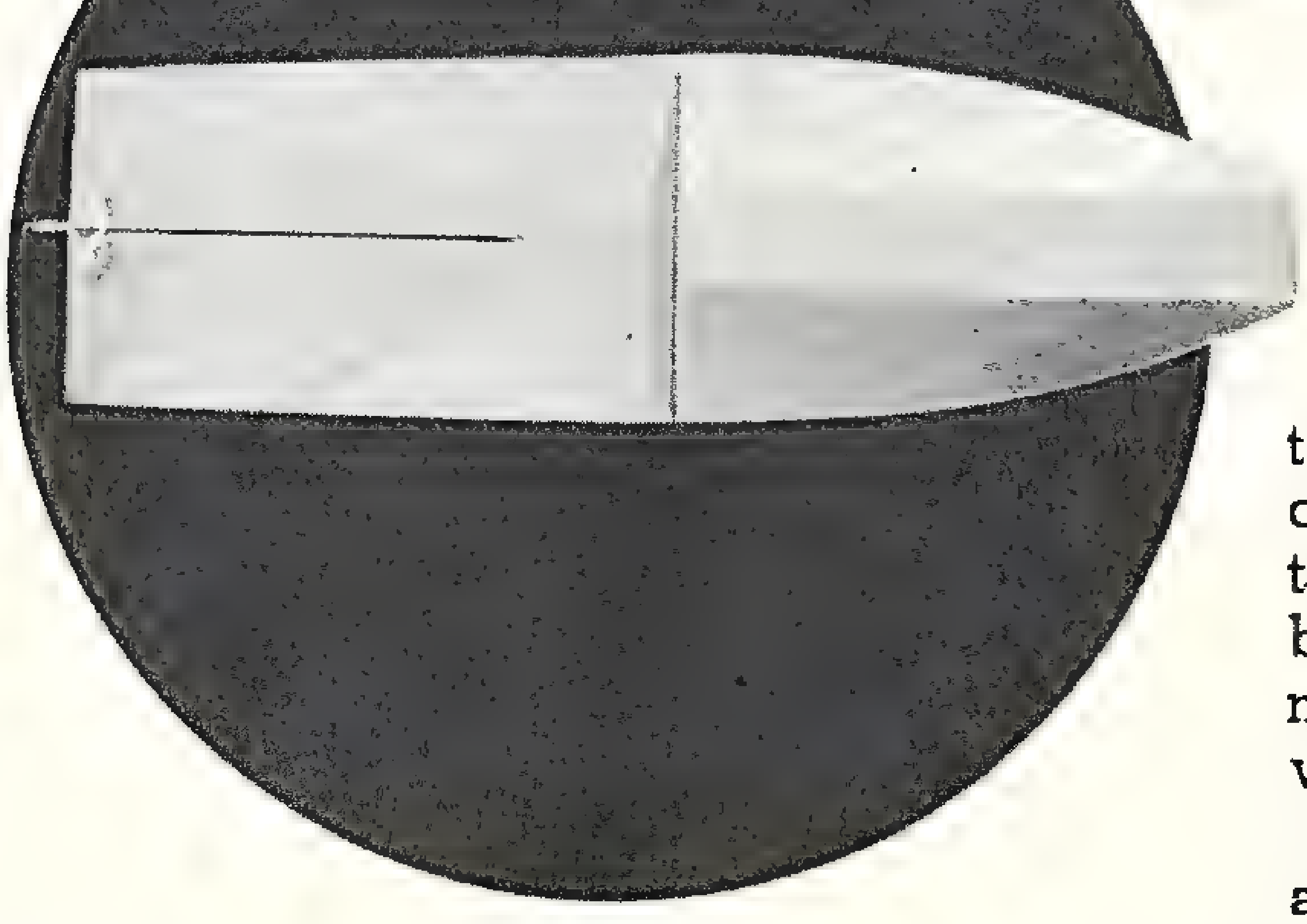

CUT KEEL PATTERN BOARD TO FULL SIZE PROFILE LINES *AFTER DEDUCTING FOR NOSE PIECES, TRANSOM AND 1/8" PLANKING AND DECKING.* THE FORMER IS REMOVED BEFORE THE DECKING IS LAID BUT *AFTER* PLANKING.
NOTCH FOR FRAMES
1
2
3
4
5
NOSE BLOCK
BEVEL & FIT TRANSOM
FIT NOSE BLOCK AND ALL FRAMES PROGRESSIVELY
3/4" PINE FORMER
TRANSOM CROWN FALLS OVER END OF BOARD AS INDICATED
DRAWING BOARD
CROWN TO SUIT
TYPICAL FRAME
VARIES WITH FRAME NO.
NOTCH FOR CLAMP
NOTCH FOR CHINE
3/4"
3-PLY
SHEER LINE
4"
FRAME NO.1 AFT OF STA. LINE
3 7/16"
2 25/32"
FRAME NO.2 AFT. OF STA. LINE
2 21/32"
FRAME NO.3 FWD. OF STA. LINE
2 15/16"
BASE LINE
2 15/32"
29/32"
STEP LINE
3 15/32"
2 9/32"
1/2"
1 1/4"
1/8"
FRAME NO.4 AFT OF LINE
2 11/32"
17/32"
FRAME NO.5
1 29/32"
1 1/4"
1 19/32"
2 3/32"
9/16"

FIG. 3 - DETAIL OF KEEL PATTERN BOARD OR JIG, SHOWING METHOD OF ASSEMBLING FRAMES

FIG. 4 - BODY PROFILES HALF WIDTHS - STATIONS 1 TO 5 ••• FOR TRANSOM SEE PROJECTION ON FIG. 1 ALL MEASUREMENTS ARE TO OUTSIDE OF PLANKING



Above is shown the detailed diagram for the keel pattern board. Cut this according to the dimensions of the keel profile pieces deducting for nose pieces, transom and 1/8" planking and decking. Bottom of finished hull is shown.

the middle of a lake, and a cord, such as a stout fishline, is hooked with a brass leader into the brass rail at the starboard side, a rudder is not required. The engine is started up and the craft gently lowered into the water. A good push sets it into motion after which the line is paid out for about fifty feet. A fishing reel mounted on a stub pole is excellent for this purpose. When the gas runs out the boat can be reeled in.

Should the cord break, or should you wish to stop the boat before the run is finished, an ignition switch on the side of the decking allows a cord or a pole to be used in swiping off the ignition in emergencies. The switch is a radio toggle type with a tubular extension. Cooling water for the engine is obtained preferably through the strut. The strut can be drilled as shown, and a tube led through the transom, from which a rubber hose is used to carry water to the jacket intake of the engine. From the jacket it is piped overboard. Although a scoop can be used the strut idea has the advantage of the engine being cooled even though the boat is not in motion. Without the strut scoop the motor will heat when running at a dock.

Ignition for the motor is supplied by an aero model spark coil. Current for the coil is obtained from four flashlight cells wired in series and soldered at the contacts to give six volts.

If the popular Duplex carburetion is used, several changes are required. One is the matter of forcing fuel to the carburetors, which in this case are higher than the fuel. To do this a rubber tube is run from the goose neck vent in the gas tank, to a small balloon which has previously been blown up by lung power to give one to two pounds above atmospheric pressure. This will keep gas at the needle valve. In the orginal carbureting system, as shown with the aero engine, no balloon is necessary.

The method of laying out the screw propeller is shown in the drawing. Be sure your wheel is a "true screw" wheel, with all parts of the blade advancing at the same pitch, so that in one turn all points would travel the

Jig Saw Aids In Making Smaller Parts For "SUNBEAM"

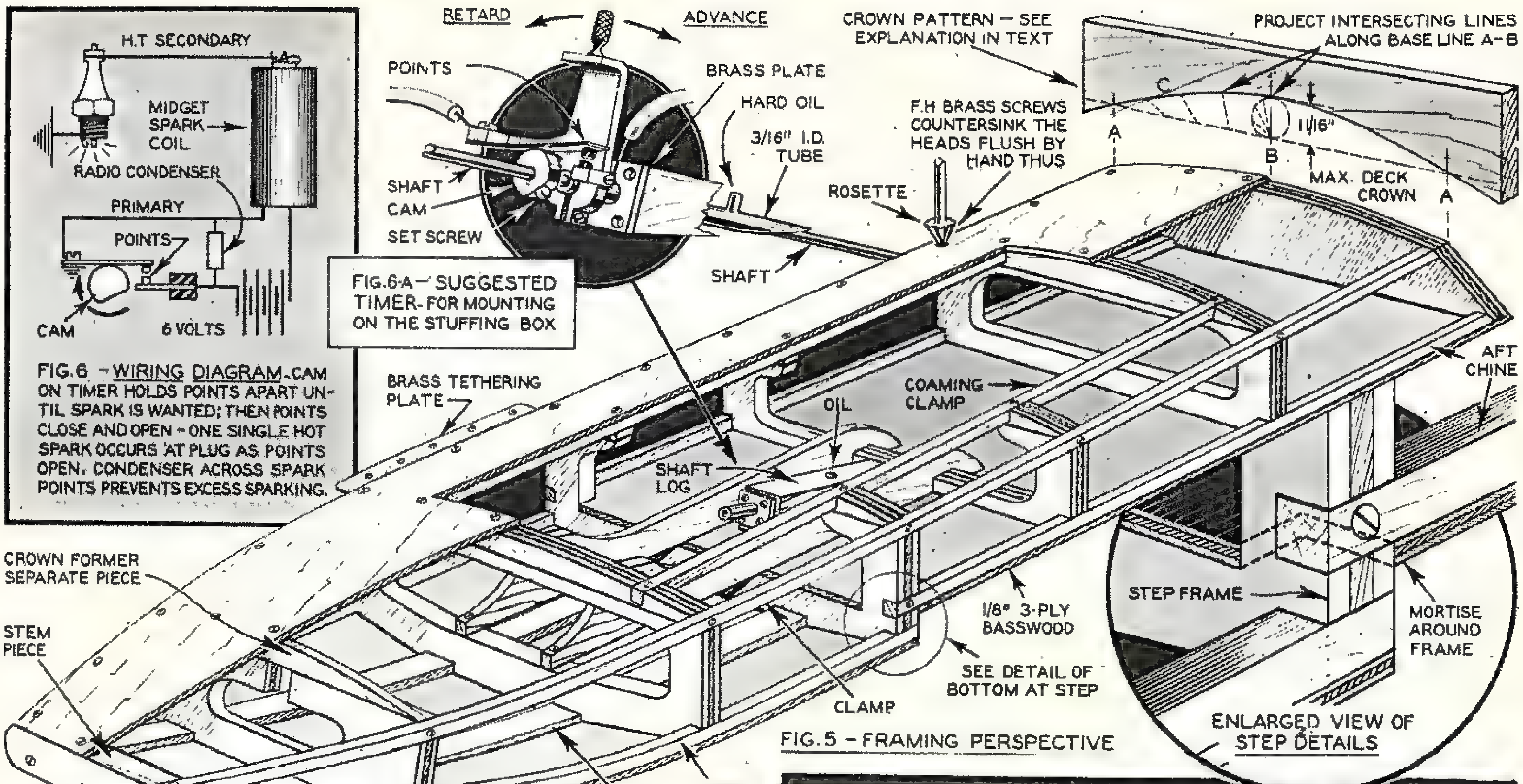

H.T SECONDARY
MIDGET SPARK COIL
RADIO CONDENSER
PRIMARY
POINTS
CAM
6 VOLTS
RETARD
ADVANCE
POINTS
BRASS PLATE
HARD OIL
3/16" I.D. TUBE
SHAFT
CAM
SET SCREW
SHAFT
CROWN PATTERN — SEE EXPLANATION IN TEXT
F.H BRASS SCREWS COUNTERSINK THE HEADS FLUSH BY HAND THUS
ROSETTE
PROJECT INTERSECTING LINES ALONG BASE LINE A-B
C
A
B
1/16"
MAX. DECK CROWN
A
AFT CHINE
BRASS TETHERING PLATE
OIL
COAMING CLAMP
SHAFT LOG
CROWN FORMER SEPARATE PIECE
STEM PIECE
STEM MOULDING
1/8" 3-PLY BASSWOOD
SEE DETAIL OF BOTTOM AT STEP
CLAMP
CHINE
REEFING CHINE
STEP FRAME
MORTISE AROUND FRAME
ENLARGED VIEW OF STEP DETAILS

FIG.6 — WIRING DIAGRAM—CAM ON TIMER HOLDS POINTS APART UNTIL SPARK IS WANTED; THEN POINTS CLOSE AND OPEN — ONE SINGLE HOT SPARK OCCURS AT PLUG AS POINTS OPEN. CONDENSER ACROSS SPARK POINTS PREVENTS EXCESS SPARKING.

FIG.6-A — SUGGESTED TIMER- FOR MOUNTING ON THE STUFFING BOX

FIG.5 — FRAMING PERSPECTIVE

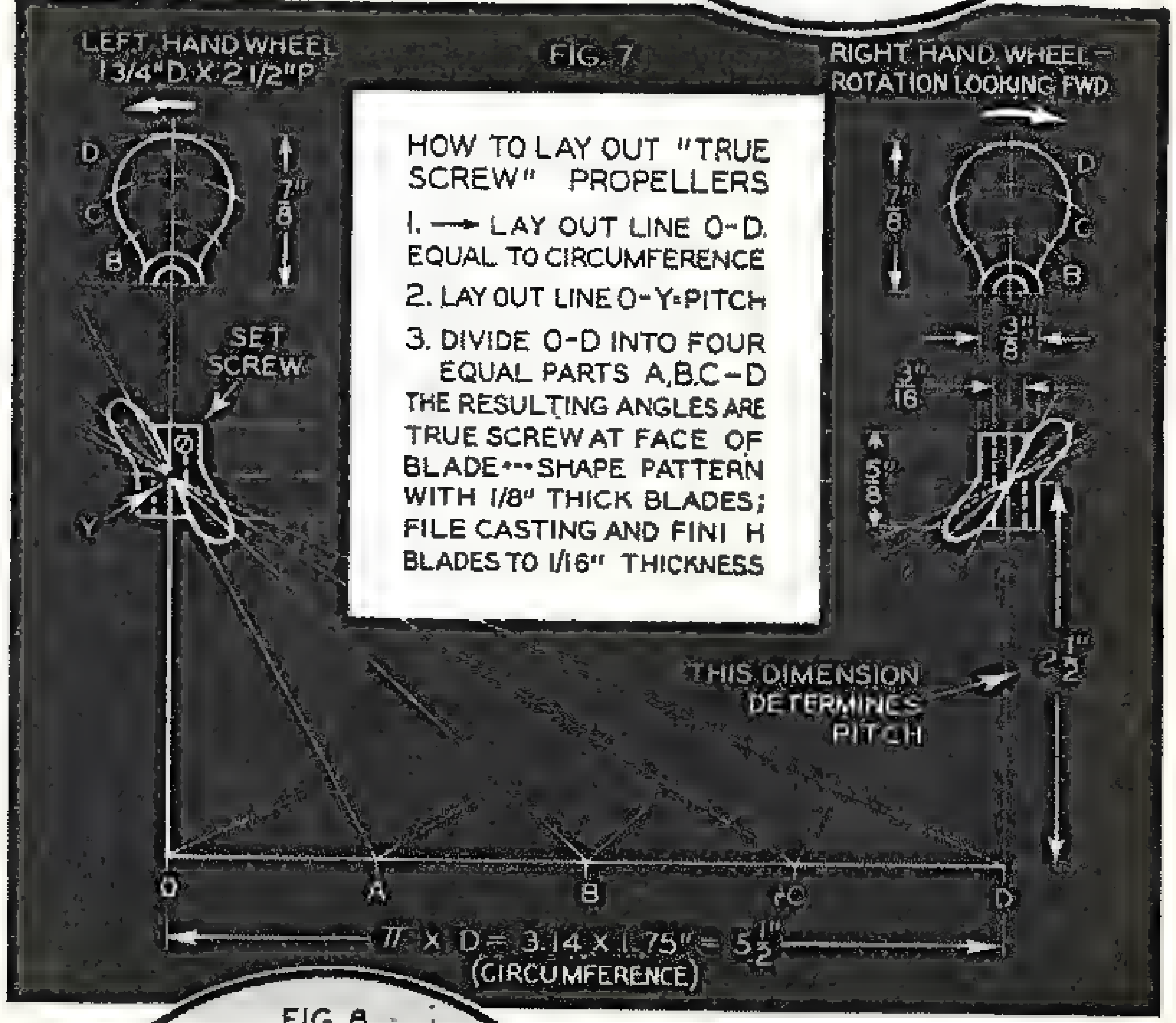
This is the appearance of the hull after the framing has been completed. Crown pieces are glued in place over the frames to form a rigid support for attaching deck. For best results use a jig or coping saw for cutting frame and crown pieces.

same distance no matter what their radii from the hub. By using the method of layout in the drawing you assure this. The wheel can be cast as shown in the diagrams, using old piston alloy stock out from junk autos for metal, or you may build up props silver soldering hammered blades to a brass hub as the drawing shows.

Should you wish a variable spark control it can be arranged by making a timer as shown in cross section on the inboard profile and in the detail drawings. This will make the engine a bit easier to start and offer the advantage of a controllable speed. In the Chinook aero the timing is fixed. In case the stuffing box timer is used the wiring is of course led to it according to the wiring diagram after which the ordinary timer becomes inoperative. The engine is started by winding a cord around the flywheel in strop fashion.

For fuel, lubricating oil is mixed with the gasoline to the ratio of about ⅓ pint to each quart. Use heavy oil, and high test gas for best results.

BLUEPRINTS FOR "SUNBEAM" SPEEDBOAT
Enlarged blueprint plans for building "Sunbeam" will greatly simplify construction. These plans are available at $1.00 postpaid. Order Blueprint No. M-412, Modern Mechanix Publ. Co., Greenwich, Conn.


LEFT HAND WHEEL 1 3/4"D.X 2 1/2"P
FIG. 7
RIGHT HAND WHEEL — ROTATION LOOKING FWD.
D
C
B
7/8"
SET SCREW
Y
3/8"
3/16"
5/8"
THIS DIMENSION DETERMINES PITCH
2 1/2"
O
A
B
C
D
π x D = 3.14 x 1.75" = 5 1/2"
(CIRCUMFERENCE)

HOW TO LAY OUT "TRUE SCREW" PROPELLERS

1. → LAY OUT LINE O-D. EQUAL TO CIRCUMFERENCE
2. LAY OUT LINE O-Y=PITCH
3. DIVIDE O-D INTO FOUR EQUAL PARTS A,B,C-D THE RESULTING ANGLES ARE TRUE SCREW AT FACE OF BLADE—SHAPE PATTERN WITH 1/8" THICK BLADES; FILE CASTING AND FINI H BLADES TO 1/16" THICKNESS

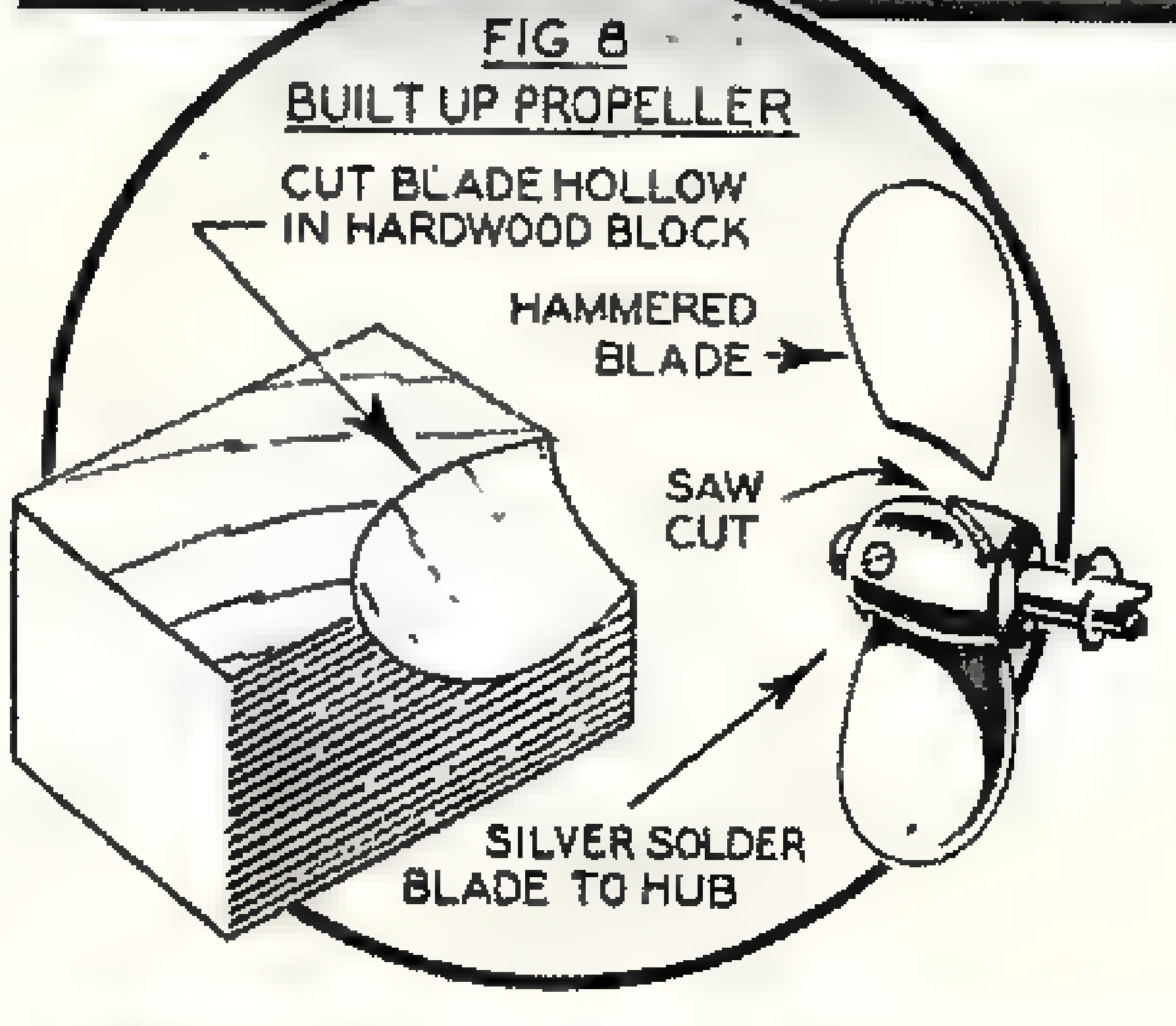
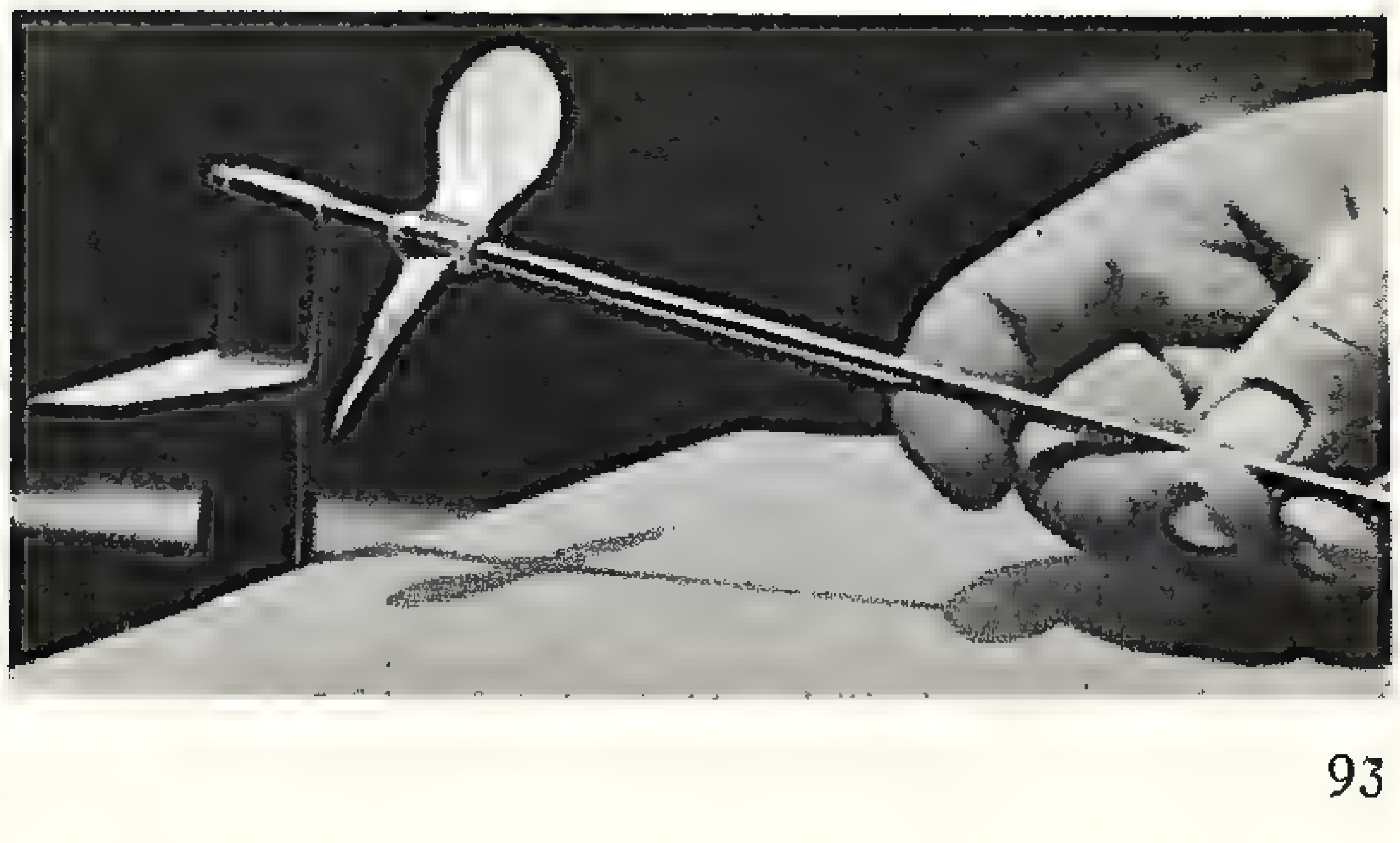


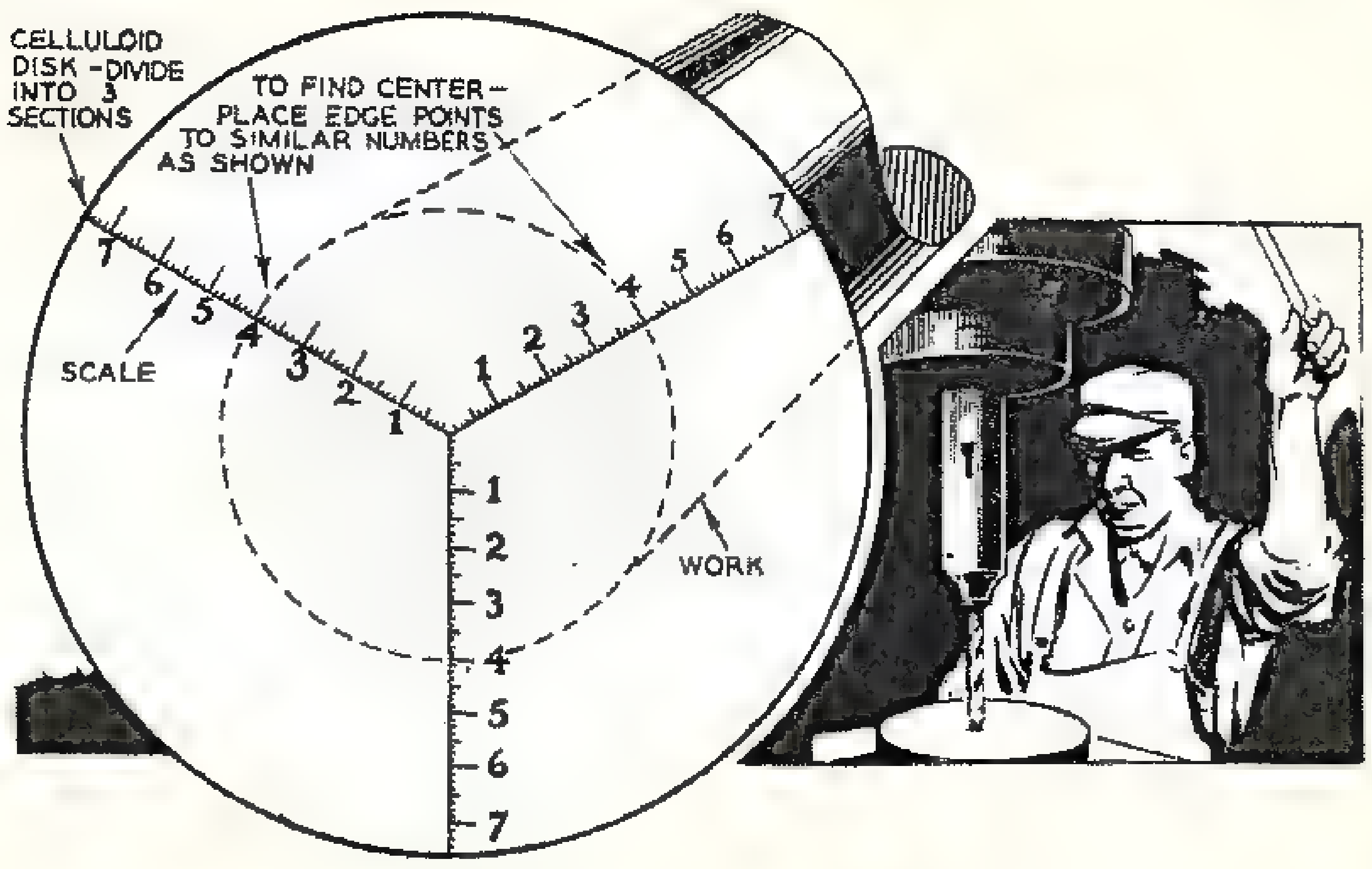
FIG 8
BUILT UP PROPELLER
CUT BLADE HOLLOW IN HARDWOOD BLOCK
HAMMERED BLADE
SAW CUT
SILVER SOLDER BLADE TO HUB

Propeller is made as shown above by soldering hammered brass blades to the propeller hub. If desired the propeller may be cast from white metal although a great deal of care is needed to do this.

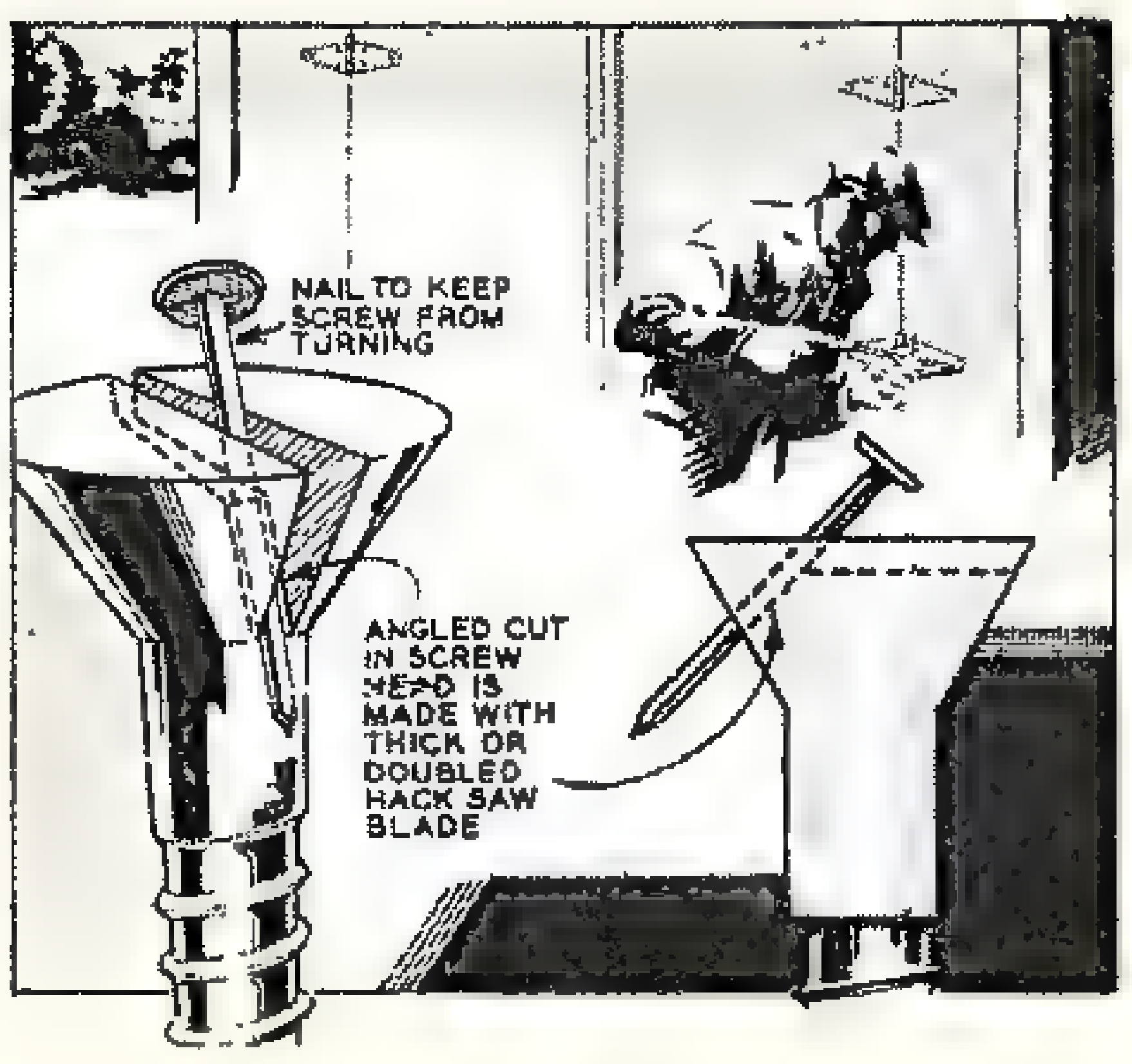


SHORT CUTS FOR THE SHOP MAN

Instrument Finds Center of Circles


CELLULOID DISK -DIVIDE INTO 3 SECTIONS
TO FIND CENTER— PLACE EDGE POINTS TO SIMILAR NUMBERS AS SHOWN
SCALE
WORK

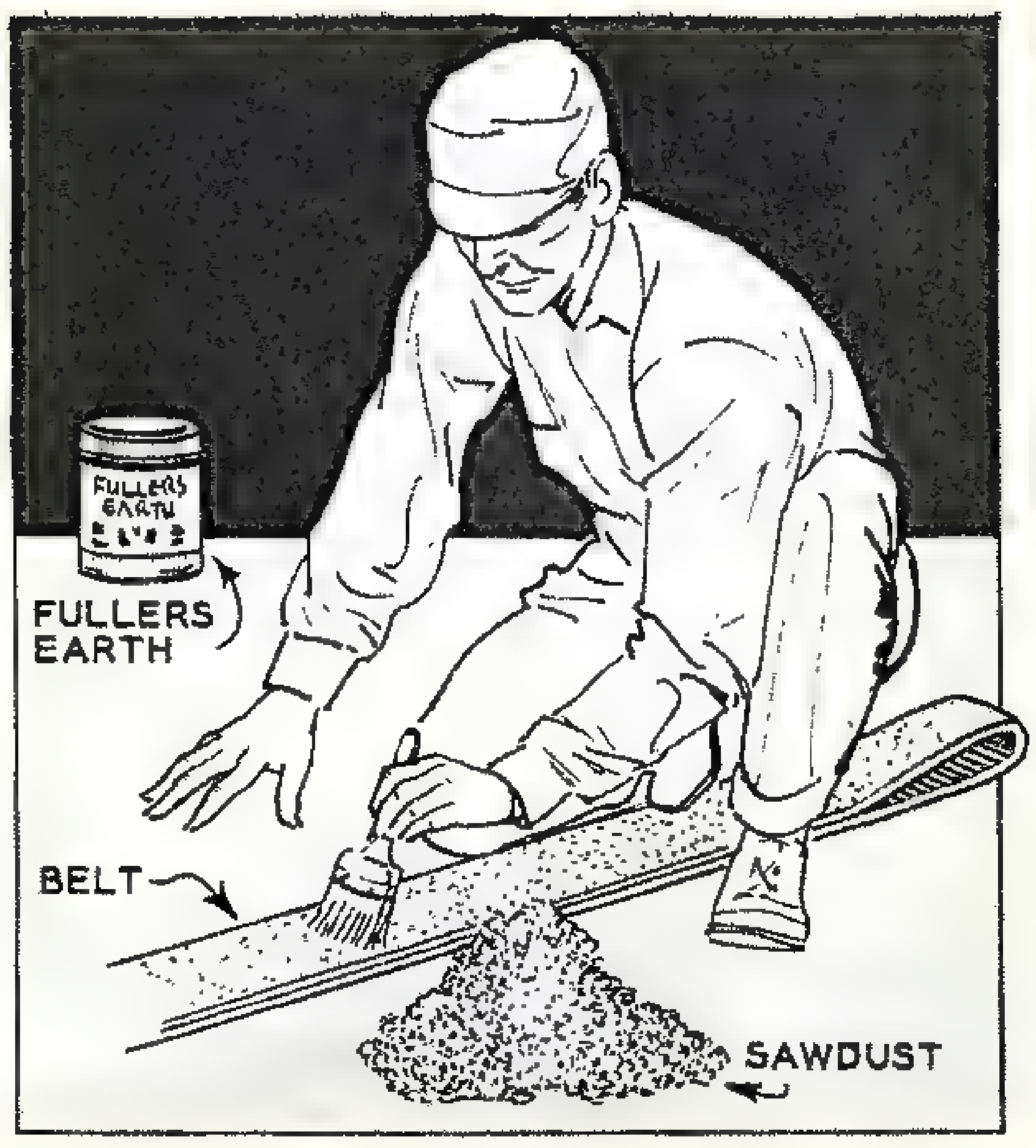
A CELLULOID disc divided into three like sections and marked off in inches as shown makes a handy rule for finding the exact center of a round object. To use the rule it is only necessary to place the disc over the end of the article to be measured and move it about until all edges show the same reading. A small hole pierced in the center of the rule permits the object to be marked with a scriber or stylus.—Dr. A. Bustamente.


NAIL TO KEEP SCREW FROM TURNING
ANGLED CUT IN SCREW HEAD IS MADE WITH THICK OR DOUBLED HACK SAW BLADE

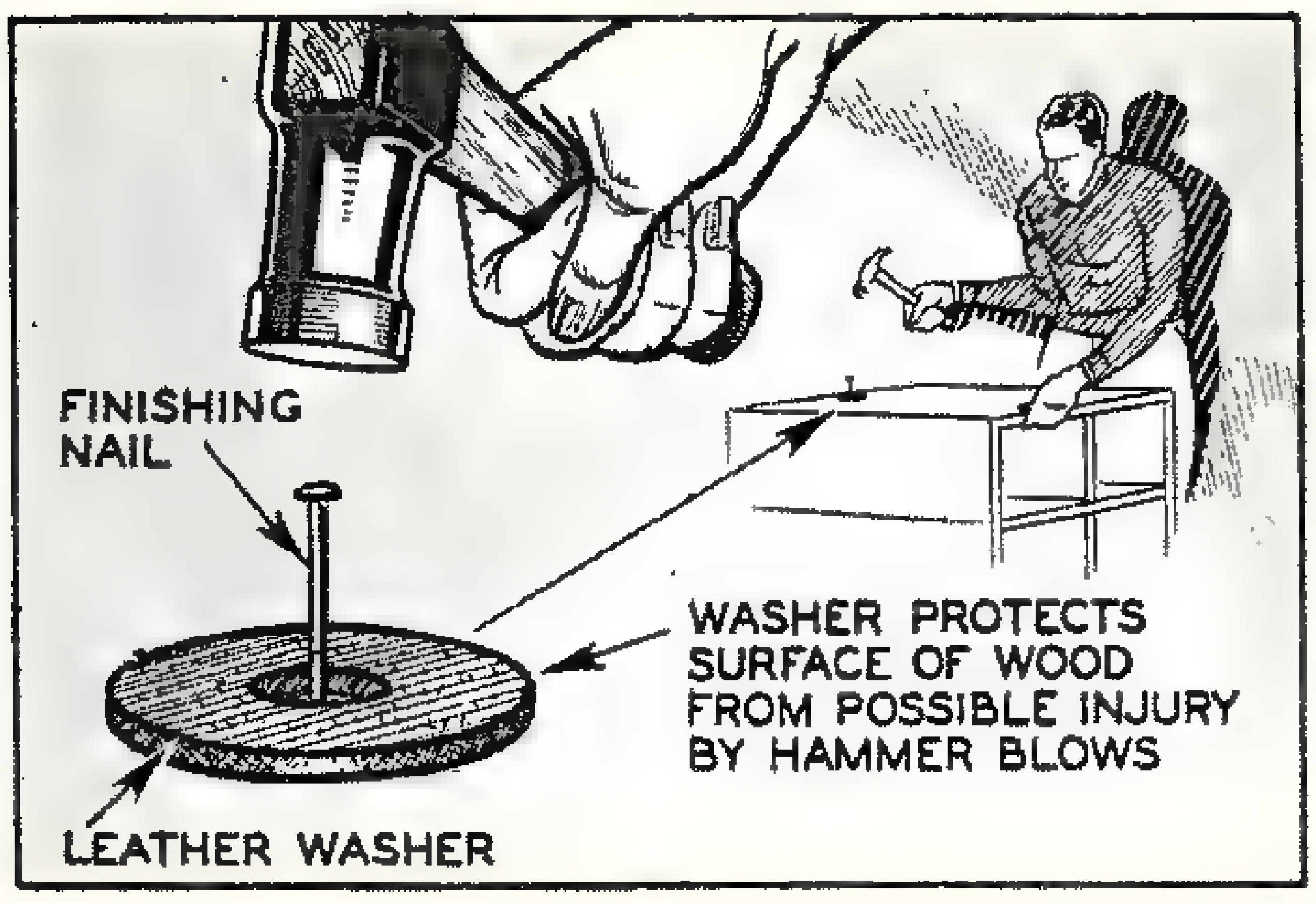
Nail Driven In Screw-Head Prevents Removal

A NAIL driven into an ordinary screw effectively thwarts any attempt to remove it from exposed hasps and hinges. A cut is made at an angle in the screw-head with a thick or double hacksaw blade. The door hinges are then mounted using the special screws. After having been securely inserted small finishing nails are driven into the enlarged slots at an angle so as to hold the screws rigid. A small countersink or punch will aid in driving the nails below the level of the screw heads.—T. L. Moore.

Sawdust Helps To Clean Oily Machine Belts


FULLERS EARTH
FULLERS EARTH
BELT
SAWDUST

LEATHER belts which have accumulated oil and grease after long usage may be restored to their original condition by scrubbing with very fine sawdust. Remove the belt from the machine and lay it flat on the floor. Scrub the sawdust over the belt using a stiff bristle brush. Rub the sawdust well into the grain of the belt so as to absorb all of the grease on the surface. When this work has been completed scrape off the sawdust with a putty knife or similar dull tool. For the final operation, coat the belt with fuller's earth and set aside to dry in a warm place. The fuller's earth removes the remaining grease particles from the pores of the leather. Treating a belt in this manner is not at all difficult and the money the operation saves is well worth the trouble.—L. Robinson.

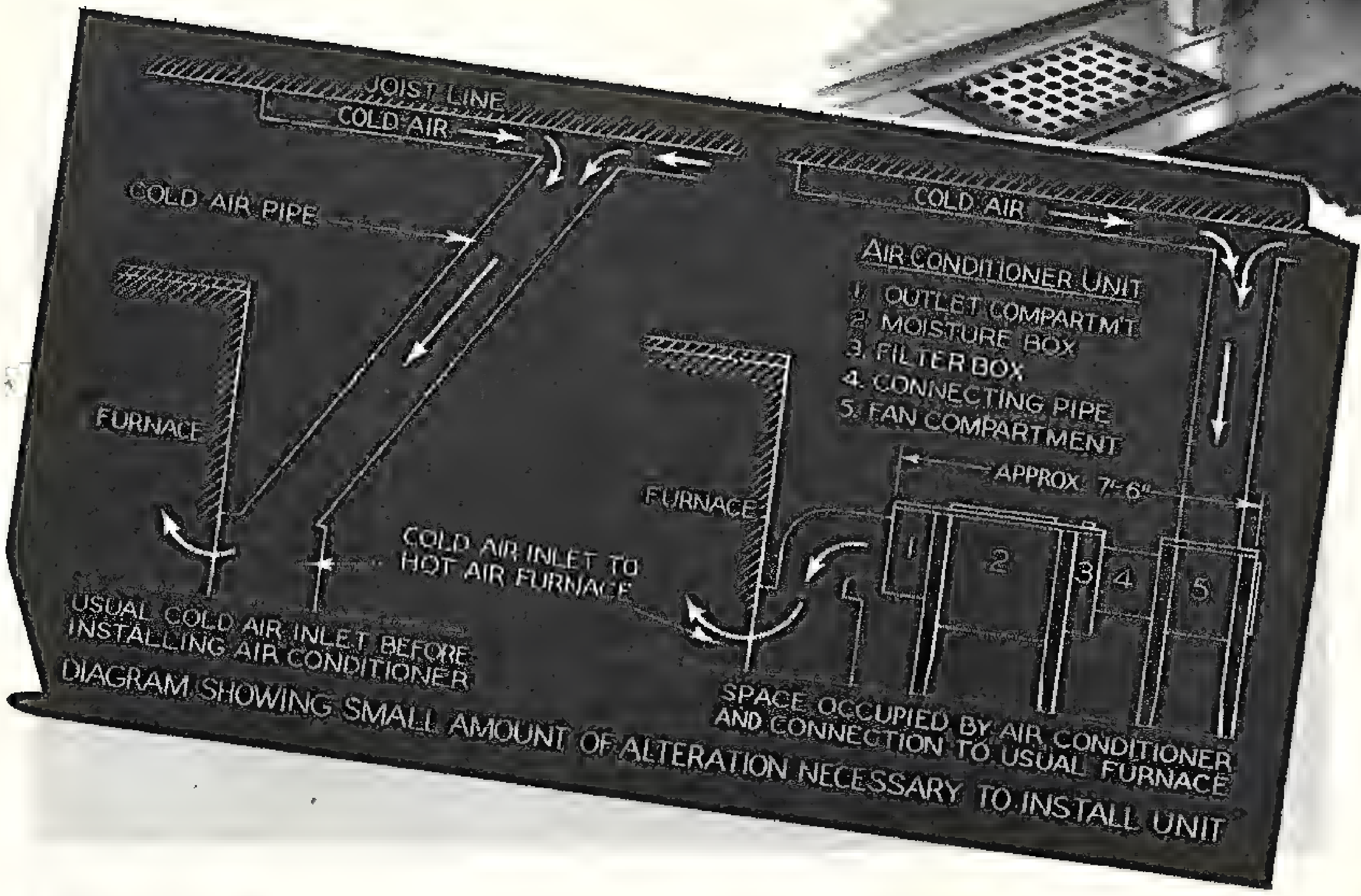

FINISHING NAIL
WASHER PROTECTS SURFACE OF WOOD FROM POSSIBLE INJURY BY HAMMER BLOWS
LEATHER WASHER

Washers Prevent Nails Marring Wood

WHEN repairing furniture about the home a slip of the hammer may result in an ugly dent in the wood. Usually the correction is either impossible or it involves a great amount of time. A simple and sure way to avoid damaging furniture during repair work is to slip a leather washer over the nail just as soon as it has been started in the wood. The nail can then be driven without the danger of the hammer doing harm.—L. B. Robbins.

A Home AIR CONDITIONER you can make

by
DALE R. VAN HORN


JOIST LINE
COLD AIR
COLD AIR PIPE
COLD AIR
AIR CONDITIONER UNIT
1. OUTLET COMPARTM'T
2. MOISTURE BOX
3. FILTER BOX
4. CONNECTING PIPE
5. FAN COMPARTMENT
FURNACE
APPROX. 7'-6"
FURNACE
1
2
3
4
5
COLD AIR INLET TO HOT AIR FURNACE
USUAL COLD AIR INLET BEFORE INSTALLING AIR CONDITIONER
SPACE OCCUPIED BY AIR CONDITIONER AND CONNECTION TO USUAL FURNACE
DIAGRAM SHOWING SMALL AMOUNT OF ALTERATION NECESSARY TO INSTALL UNIT

The diagram at left shows the manner in which the air conditioner is connected to the basement furnace. The cooling system couples with the cold air inlet on the furnace which in turn carries the cool air to all parts of the home. This refrigeration plant is not only inexpensive to build, but it has the added feature of consuming very little water and electricity during continual summer operation.

WITH theaters, trains, ships and stores provided with air conditioning equipment there is no reason why the home owner should go without this modern convenience. A practical air conditioner can be built by anyone familiar with tools at very little expense. Through its ingenious design the pipes of warm air heating systems may be used to carry the cool air to all parts of the house.

This air conditioner has been designed primarily to best suit the needs of the home shop fan. For the most part, simple construction predominates. As may be seen, many of the dimensions are arbitrary for the average home is blessed with any one of a number of heating plant types. This conditioner will fit nicely into any home having hot air heat for the adjustments needed to fit the unit into place are few.

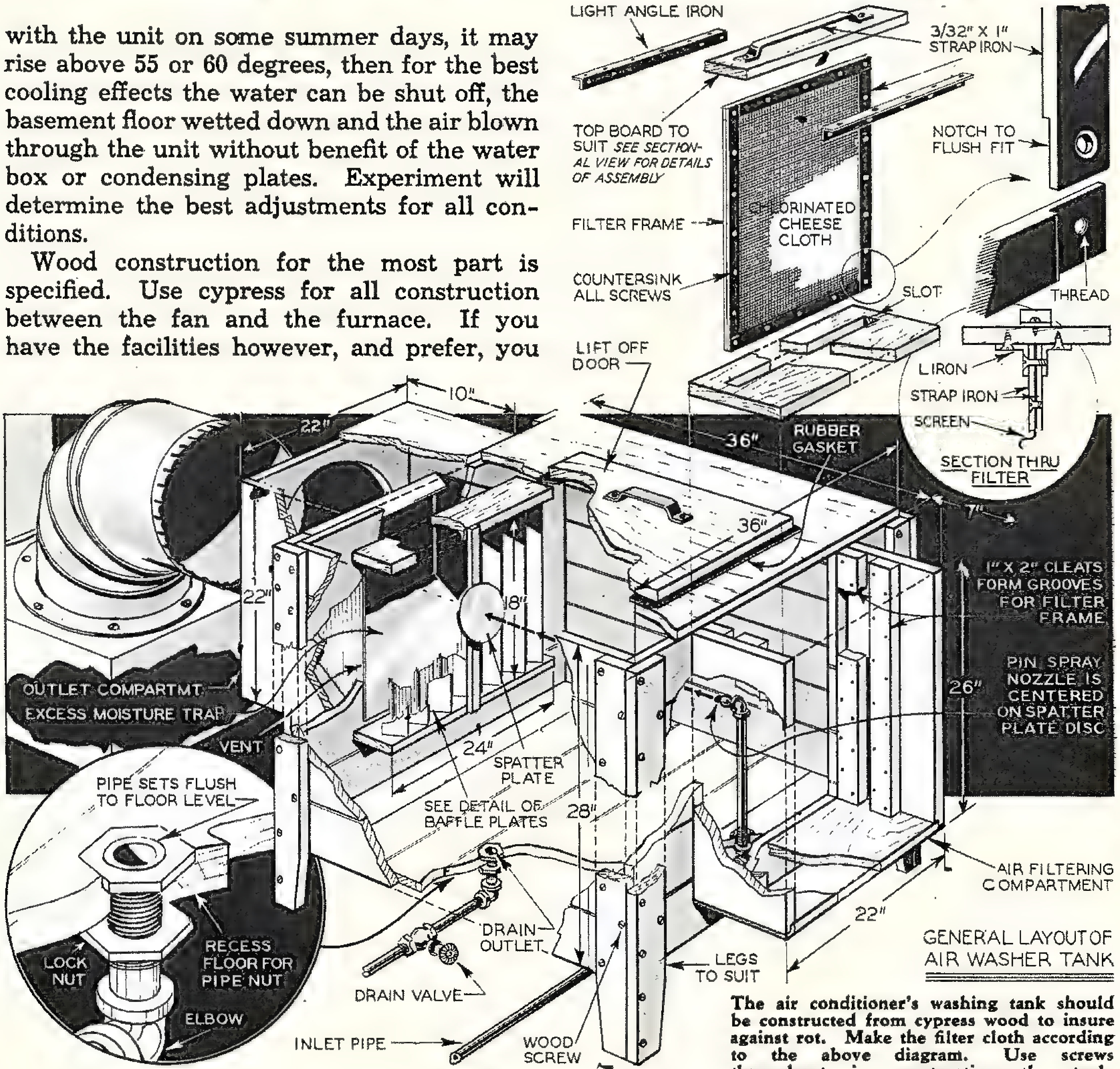
An air conditioner, to be efficient, adds moisture to the dry air of winter months, and removes excess moisture from over humid air during certain summer conditions. It is an all-the-year-round unit of benefit, helping to make homes more comfortable in winter and more tolerable on excessively hot summer days.

A glance at the drawings will show that this unit has four major parts. There is the fan compartment, the filter box, the moisture box and the condensing plates. In winter the conditioner is hooked up between the furnace and the cold air pipes. In summer, the unit may be left as for winter or the down pipe over the fan box may be removed, thus permitting the cool air of the basement, rather than the cooler air from upstairs, to be used. If water from city mains is used ordinarily

Air Conditioner Sends Cool Breezes Through Heater Pipes

with the unit on some summer days, it may rise above 55 or 60 degrees, then for the best cooling effects the water can be shut off, the basement floor wetted down and the air blown through the unit without benefit of the water box or condensing plates. Experiment will determine the best adjustments for all conditions.

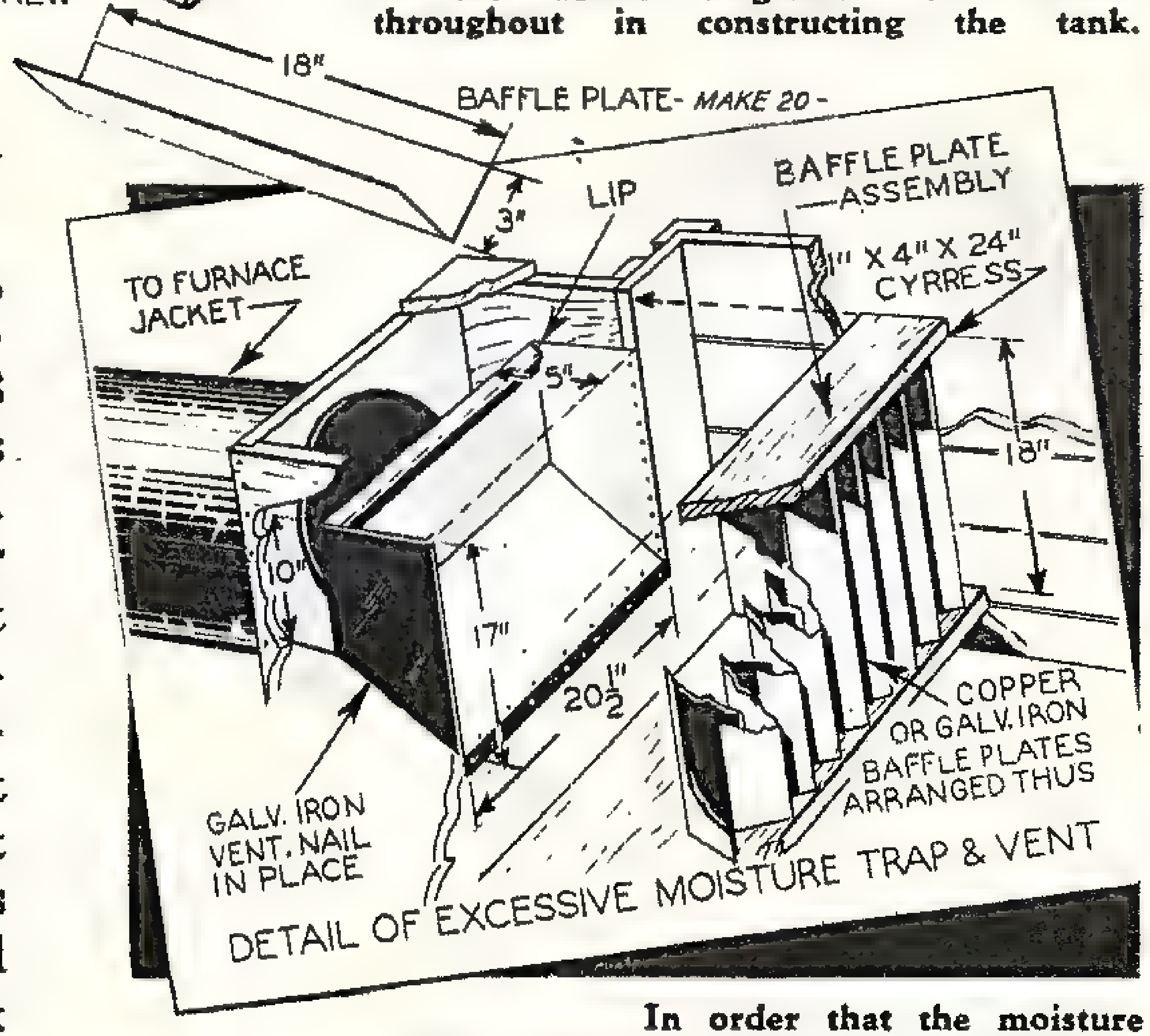
Wood construction for the most part is specified. Use cypress for all construction between the fan and the furnace. If you have the facilities however, and prefer, you can substitute galvanized iron for practically all of the sections.


LIGHT ANGLE IRON
3/32" X 1" STRAP IRON
TOP BOARD TO SUIT SEE SECTIONAL VIEW FOR DETAILS OF ASSEMBLY
NOTCH TO FLUSH FIT
FILTER FRAME
CHLORINATED CHEESE CLOTH
COUNTERSINK ALL SCREWS
SLOT
THREAD
LIFT OFF DOOR
L IRON
STRAP IRON
SCREEN
SECTION THRU FILTER
10"
22"
36"
RUBBER GASKET
36"
7"
22"
18"
1" X 2" CLEATS FORM GROOVES FOR FILTER FRAME
PIN SPRAY NOZZLE IS CENTERED ON SPATTER PLATE DISC
26"
OUTLET COMPARTMT. EXCESS MOISTURE TRAP
VENT
24"
SPATTER PLATE
SEE DETAIL OF BAFFLE PLATES
28"
PIPE SETS FLUSH TO FLOOR LEVEL
LOCK NUT
RECESS FLOOR FOR PIPE NUT
ELBOW
DRAIN OUTLET
DRAIN VALVE
INLET PIPE
WOOD SCREW
LEGS TO SUIT
22"
AIR FILTERING COMPARTMENT

GENERAL LAYOUT OF AIR WASHER TANK

The air conditioner's washing tank should be constructed from cypress wood to insure against rot. Make the filter cloth according to the above diagram. Use screws throughout in constructing the tank.

Tongue and groove the boards for the top, sides, ends and bottom of the water compartment. They are 3 feet square and 26 to 28 inches high. The baffle or condenser plates are bent in "V" shape and installed, as shown. Directly in front of the baffle a hole is cut for the outlet compartment. The wet air draft passes between the off-set plates which condense the surplus moisture, and is then deflected upward by the galvanized iron vent which is nailed to the inside walls of the outlet compartment. A lip of galvanized iron is bent over as shown so that an occasional drop of water will be caught and thrown back into the water box. After passing through


18"
BAFFLE PLATE- MAKE 20 -
3"
LIP
BAFFLE PLATE ASSEMBLY
1" X 4" X 24" CYPRESS
TO FURNACE JACKET
5"
18"
10"
17"
20½"
COPPER OR GALV. IRON BAFFLE PLATES ARRANGED THUS
GALV. IRON VENT. NAIL IN PLACE
DETAIL OF EXCESSIVE MOISTURE TRAP & VENT

In order that the moisture does not pass into the furnace jacket a metal lip as shown above is installed directly behind baffle.

Pictorial Diagrams Aid In Simplyfying Construction

the vent the air enters the 16-inch pipe and on into the furnace jacket.

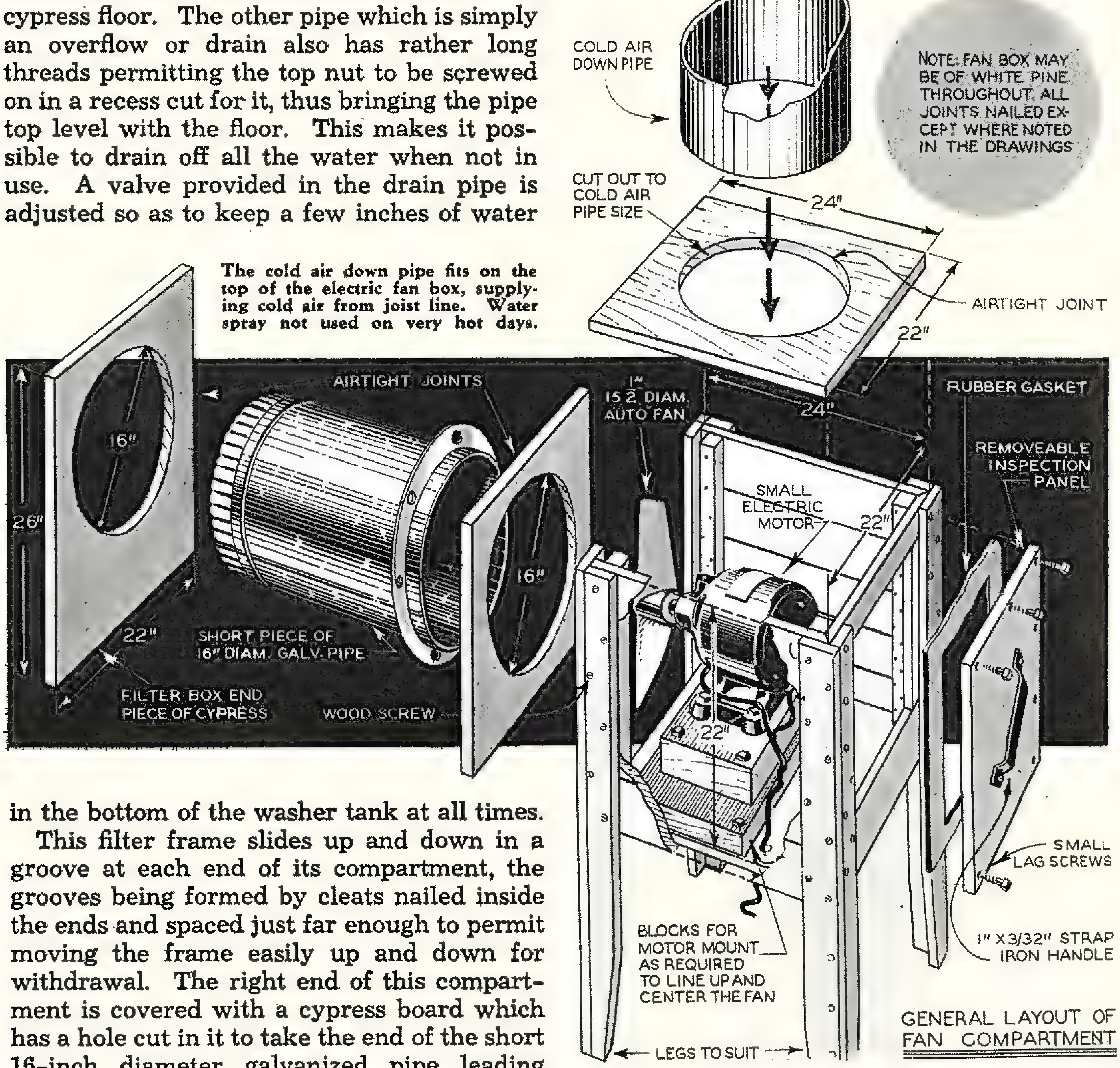
In the center of the baffle mount a strip for supporting a copper disc to form the spatter plate. The disc should be in direct line with the pin stream of water which issues from the spray nozzle. The tiny stream of water strikes the spatter plate and is broken into minute parts which cool and wet the air.

The piping comprises an inlet pipe near the right end of the water box of sufficient height that when the nozzle has been screwed on the pin stream is centered with the spatter plate. The lower end of the pipe is provided with 2 inches of thread, permitting thin nuts and washers to be screwed on each side of the cypress floor. The other pipe which is simply an overflow or drain also has rather long threads permitting the top nut to be screwed on in a recess cut for it, thus bringing the pipe top level with the floor. This makes it possible to drain off all the water when not in use. A valve provided in the drain pipe is adjusted so as to keep a few inches of water in the bottom of the washer tank at all times.

This filter frame slides up and down in a groove at each end of its compartment, the grooves being formed by cleats nailed inside the ends and spaced just far enough to permit moving the frame easily up and down for withdrawal. The right end of this compartment is covered with a cypress board which has a hole cut in it to take the end of the short 16-inch diameter galvanized pipe leading from the fan box.

The fan box can be made of white pine if desired, since no moisture of an excessive nature will be present here. A standard air fan can be mounted on the motor shaft, although a 2-bladed aluminum propeller fan is to be desired due to the high speed of the motor. A second-hand washing machine motor will do nicely for the power plant. It is essential, of course, to have the motor mounted on blocks to center the fan accurately. The blade tips should clear the sides of the galvanized pipe not more than ¼-inch all the way around. By providing small lag screws on the end of the motor box easy

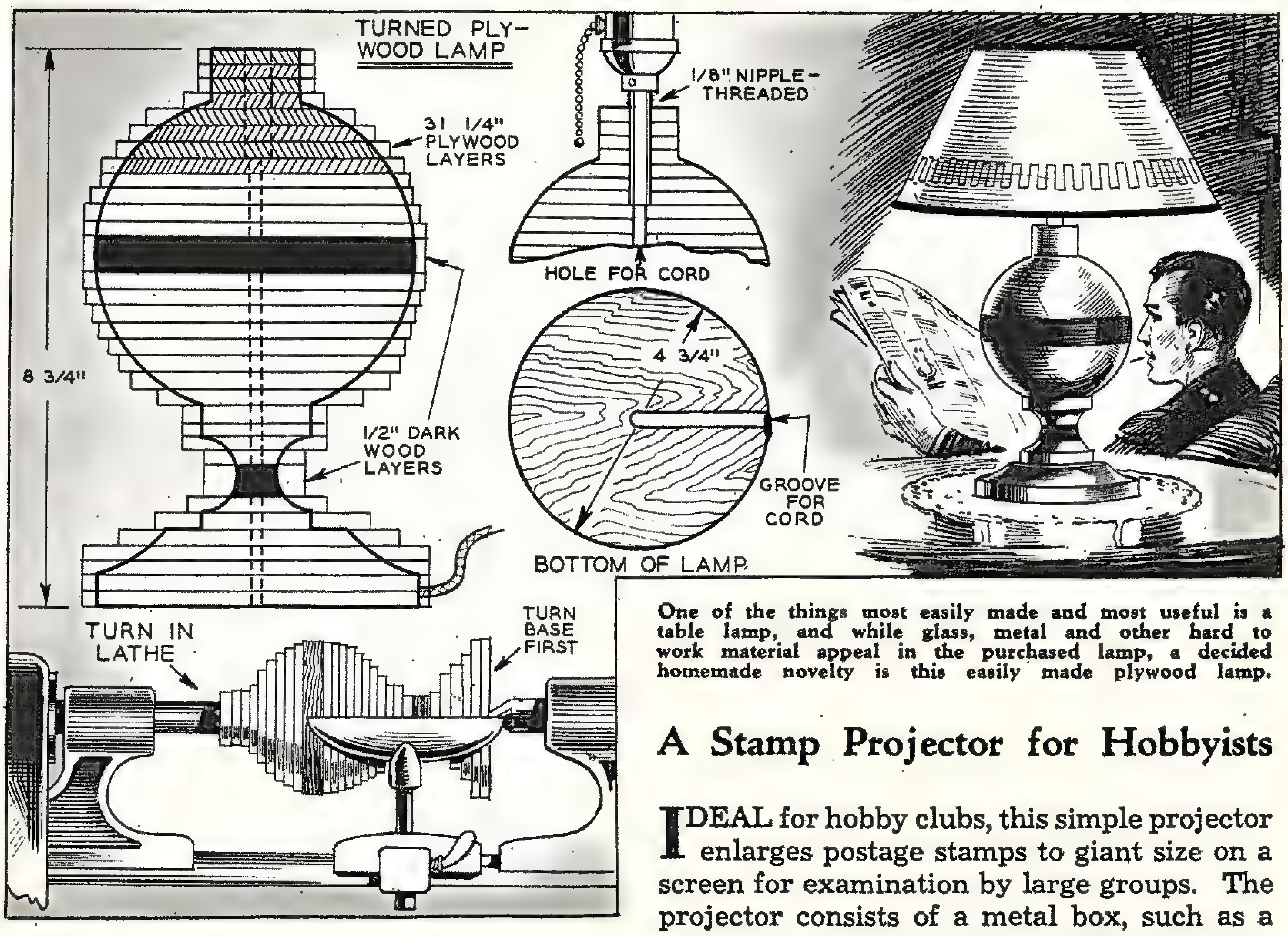
[*Continued on page* 122]


COLD AIR DOWN PIPE
NOTE: FAN BOX MAY BE OF WHITE PINE THROUGHOUT. ALL JOINTS NAILED EXCEPT WHERE NOTED IN THE DRAWINGS
CUT OUT TO COLD AIR PIPE SIZE
24"
AIRTIGHT JOINT
22"
AIRTIGHT JOINTS
1" IS 2 DIAM. AUTO FAN
24"
RUBBER GASKET
REMOVEABLE INSPECTION PANEL
SMALL ELECTRIC MOTOR
22"
16"
26"
16"
22"
SHORT PIECE OF 16" DIAM. GALV. PIPE
FILTER BOX END PIECE OF CYPRESS
WOOD SCREW
22"
SMALL LAG SCREWS
BLOCKS FOR MOTOR MOUNT AS REQUIRED TO LINE UP AND CENTER THE FAN
1" X 3/32" STRAP IRON HANDLE
LEGS TO SUIT
GENERAL LAYOUT OF FAN COMPARTMENT

The cold air down pipe fits on the top of the electric fan box, supplying cold air from joist line. Water spray not used on very hot days.

Build the fan compartment according to above specifications, mounting the motor on blocks for simplified adjustment. An old automobile fan is excellent for supplying necessary draft.

Attractive Lamp Turned From Plywood


TURNED PLY-WOOD LAMP
31 1/4" PLYWOOD LAYERS
8 3/4"
1/2" DARK WOOD LAYERS
1/8" NIPPLE-THREADED
HOLE FOR CORD
4 3/4"
GROOVE FOR CORD
BOTTOM OF LAMP
TURN IN LATHE
TURN BASE FIRST

One of the things most easily made and most useful is a table lamp, and while glass, metal and other hard to work material appeal in the purchased lamp, a decided homemade novelty is this easily made plywood lamp.

A TURNED lamp is the ideal solution for using up scrap plywood lying about the shop. The layers of plywood are cut out in discs with a jig or band saw and glued together. At the largest part of the lamp is placed a layer of walnut or other dark wood. Another layer of dark wood is placed at the smallest point in the lamp stand.

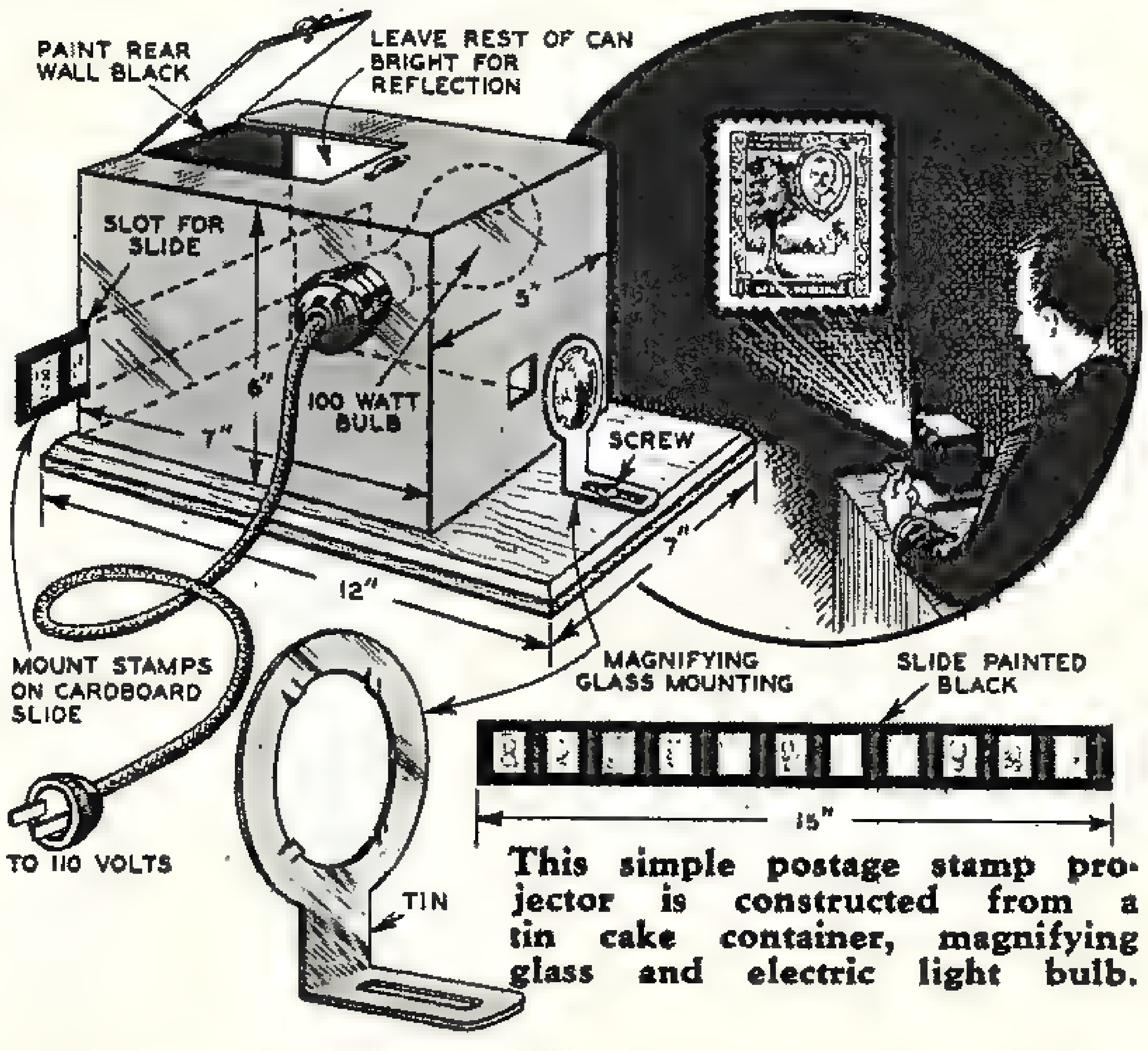
The turning is a slow process and only a small cut can be taken at a time for there is a lot of mixd end grains to work with. The turning tools must be very sharp and considerable sanding must be done at the finish to get a smooth job. The smoothness of the end grains is what gives the beauty to this lamp.

The lamp is placed in the lathe with the chuck against the top and the turning is done from the bottom up. The base is completed before the small part of the spindle is turned out. Then the bowl is turned and finally the neck. The idea is to work so as to save strain on the small part while working on the larger parts.

A ⅛" brass nipple is set in the top of the lamp for attaching the pull socket. The lamp is fitted with a ten-inch shade.

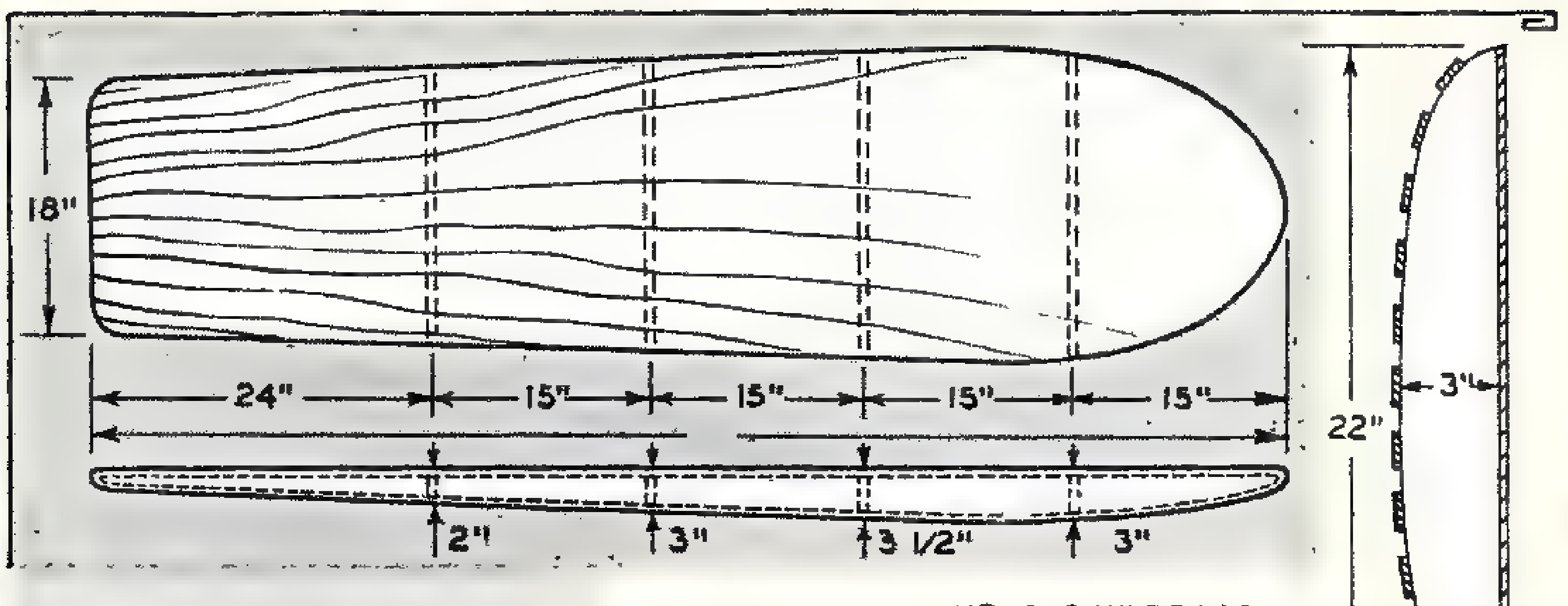
A Stamp Projector for Hobbyists

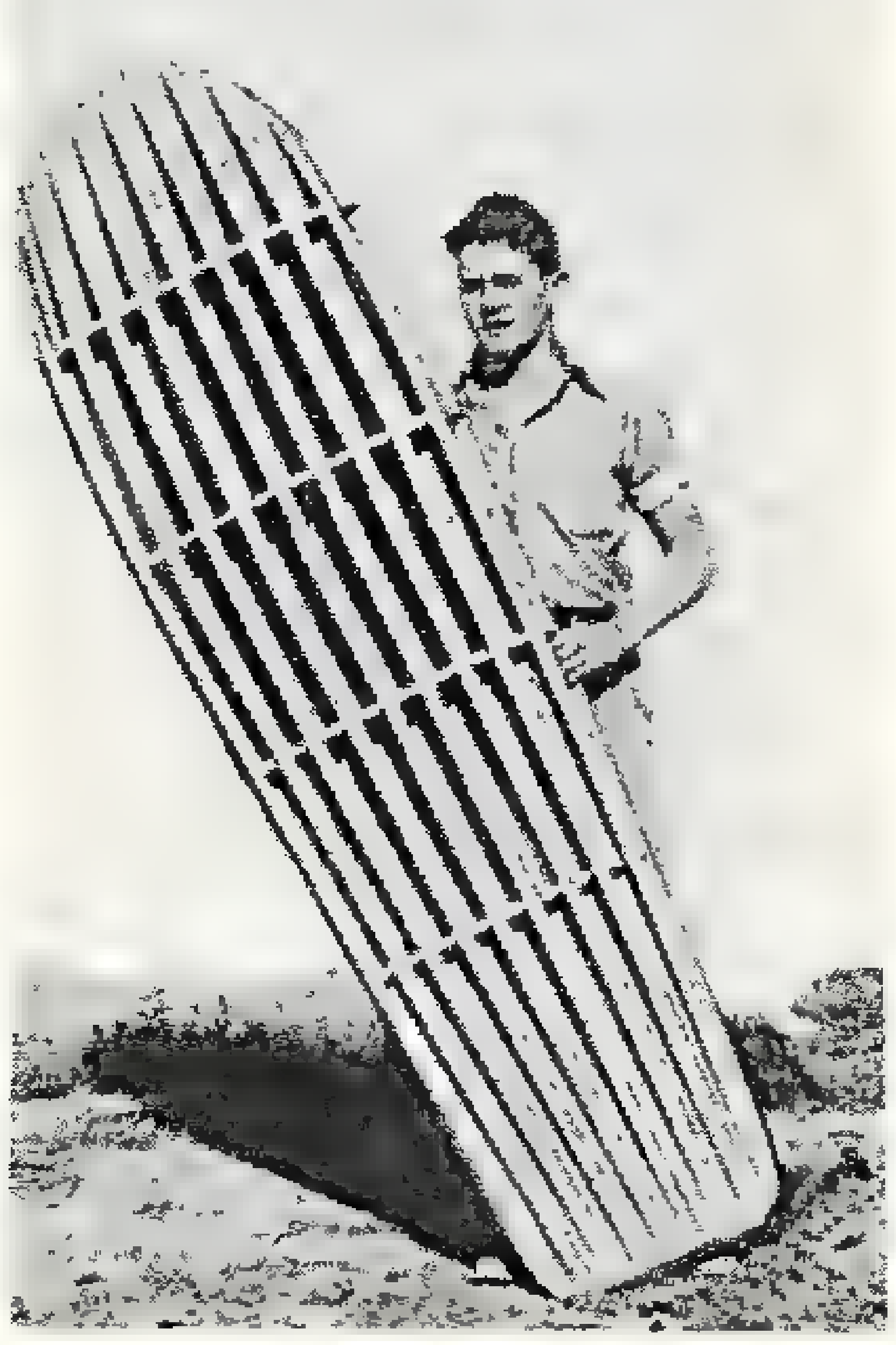
IDEAL for hobby clubs, this simple projector enlarges postage stamps to giant size on a screen for examination by large groups. The projector consists of a metal box, such as a cake can, in which has been mounted a light socket to take a 100-watt lamp. Slots cut in the rear of the can allow for the stamp slide. A small square opening is cut in the front of the can so that the image may be projected through the lens which is an ordinary 10-cent magnifying glass. Mount the glass on an adjustable strip so that the stamps may be brought into focus properly.

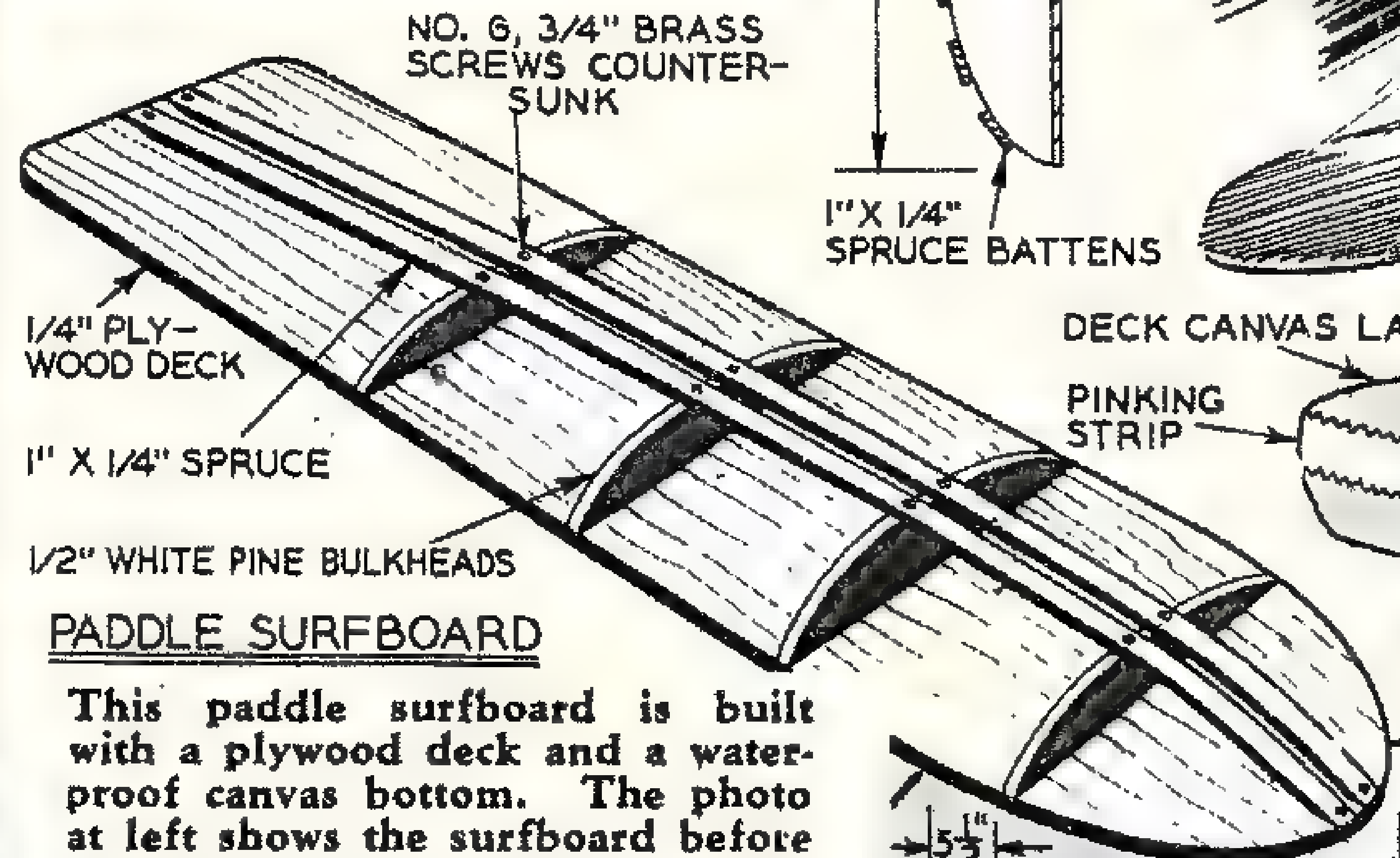

PAINT REAR WALL BLACK
LEAVE REST OF CAN BRIGHT FOR REFLECTION
SLOT FOR SLIDE
5"
6"
7"
100 WATT BULB
SCREW
12"
7"
MOUNT STAMPS ON CARDBOARD SLIDE
MAGNIFYING GLASS MOUNTING
SLIDE PAINTED BLACK
15"
TO 110 VOLTS
TIN

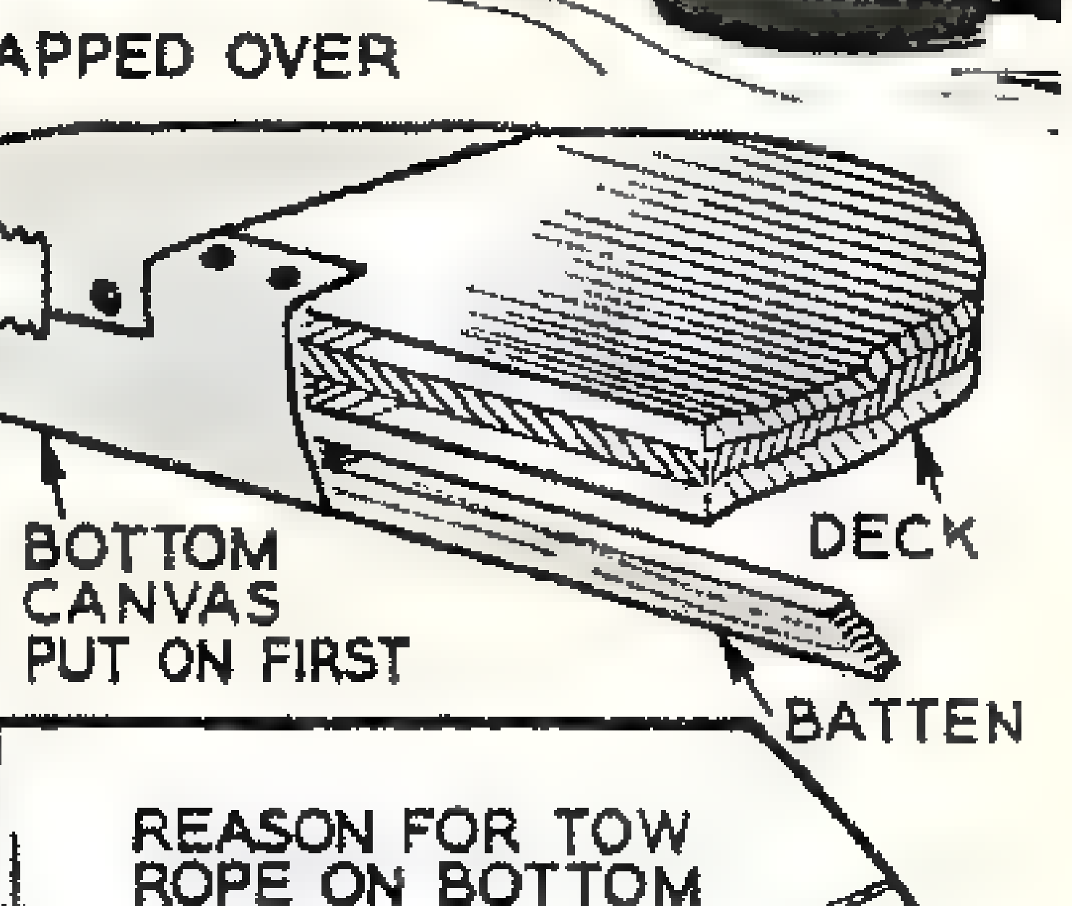
This simple postage stamp projector is constructed from a tin cake container, magnifying glass and electric light bulb.

SURFBOARDS FOR SUMMER SPORT


18"
24"
15"
15"
15"
15"
2"
3"
3 1/2"
3"
3"
22"

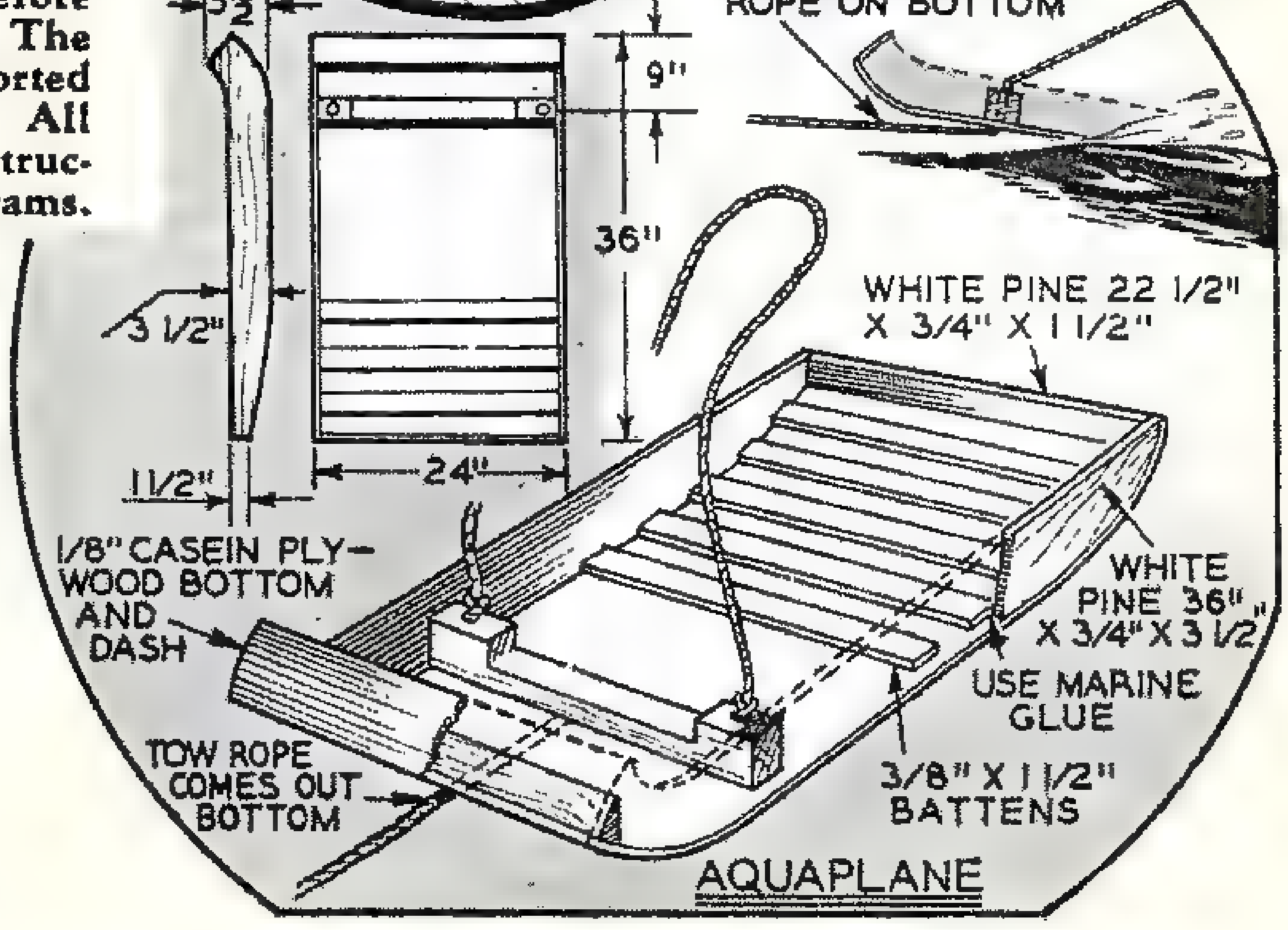



NO. 6, 3/4" BRASS SCREWS COUNTERSUNK
1"X 1/4" SPRUCE BATTENS
1/4" PLYWOOD DECK
1" X 1/4" SPRUCE
1/2" WHITE PINE BULKHEADS


DECK CANVAS LAPPED OVER
PINKING STRIP
BOTTOM CANVAS PUT ON FIRST
DECK
BATTEN

PADDLE SURFBOARD

This paddle surfboard is built with a plywood deck and a waterproof canvas bottom. The photo at left shows the surfboard before the canvas has been attached. The ribs are of spruce and supported by white pine bulkheads. All dimensions required for construction appear in the above diagrams.


5 1/2"
9"
36"
3 1/2"
1 1/2"
24"
REASON FOR TOW ROPE ON BOTTOM
WHITE PINE 22 1/2" X 3/4" X 1 1/2"
1/8" CASEIN PLYWOOD BOTTOM AND DASH
WHITE PINE 36" X 3/4" X 3 1/2
USE MARINE GLUE
TOW ROPE COMES OUT BOTTOM
3/8" X 1 1/2" BATTENS
AQUAPLANE

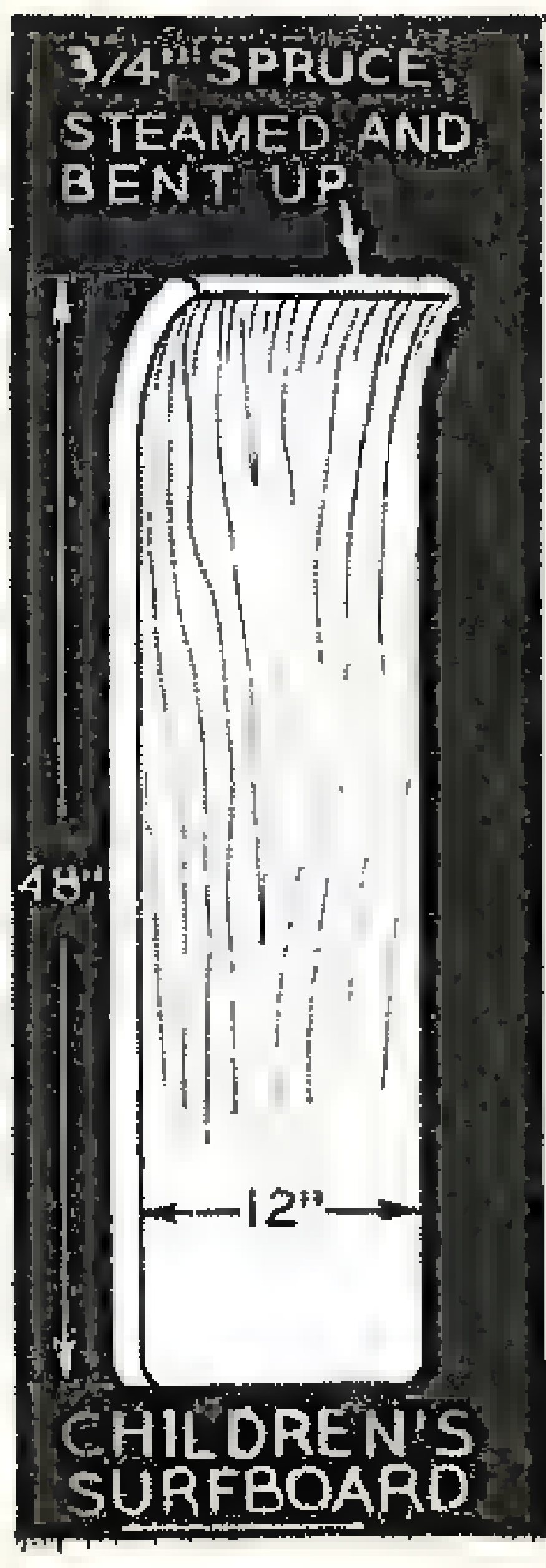
Designed for towing behind a speedboat, the construction of this aquaplane is such that it will float like a boat at all times. Use plywood for the bottom construction with ¾-inch white pine stock for sides. Tow rope is attached on the bottom.

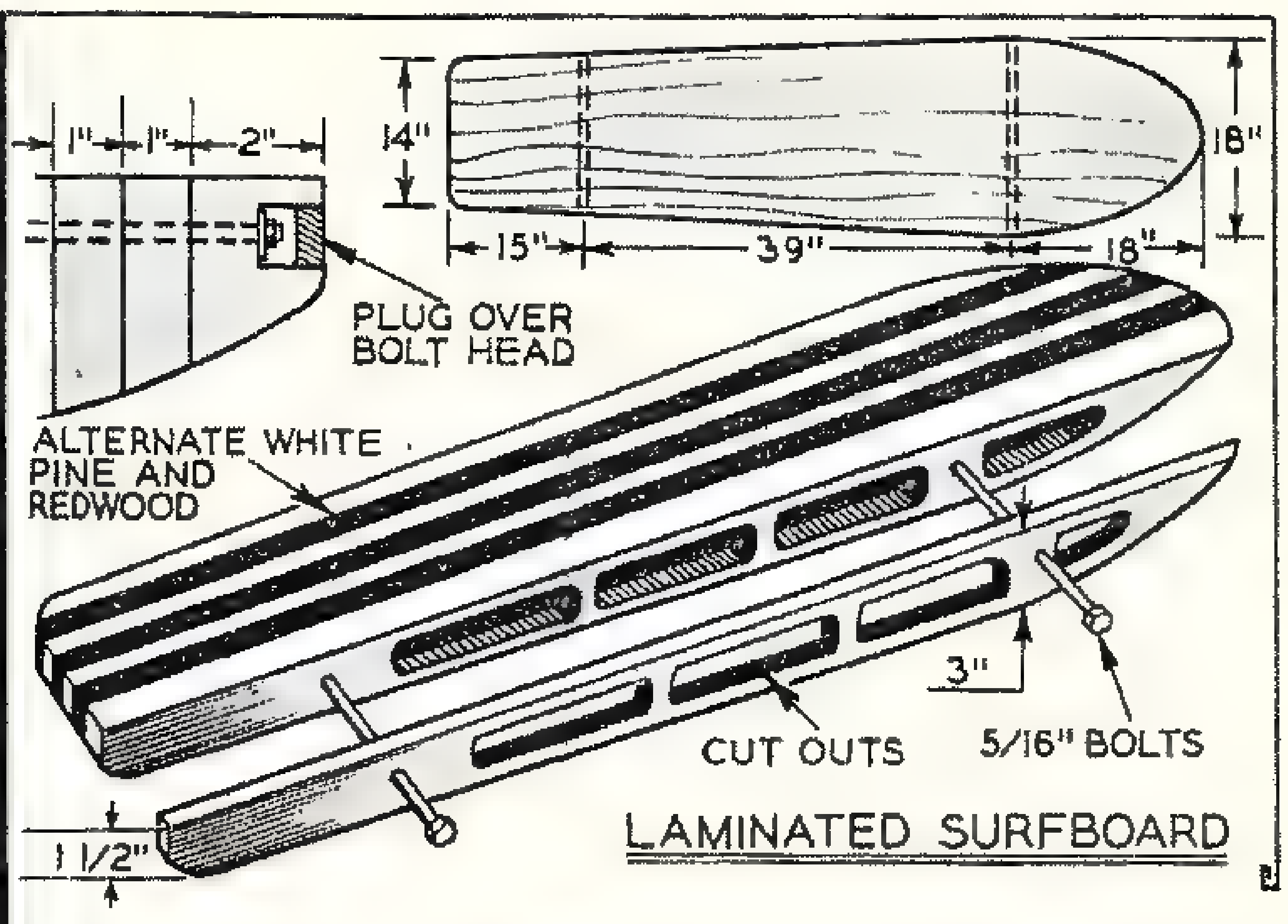
IF YOU are one of those who have thrilled at a surf rider's antics and wished for your own surfboard here is your chance to build it.

The four types of surfboards described here just about cover every demand and all of them are very easily constructed at home.

The largest is really a paddle board, being buoyant enough for the rider to lie flat and paddle far out into the rollers with safety. It consists simply of a thin plywood deck, four white pine bulkheads over which are installed nine spruce battens, or strakes. Casein waterproof glue is used in all joints and the battens are secured with countersunk brass screws.

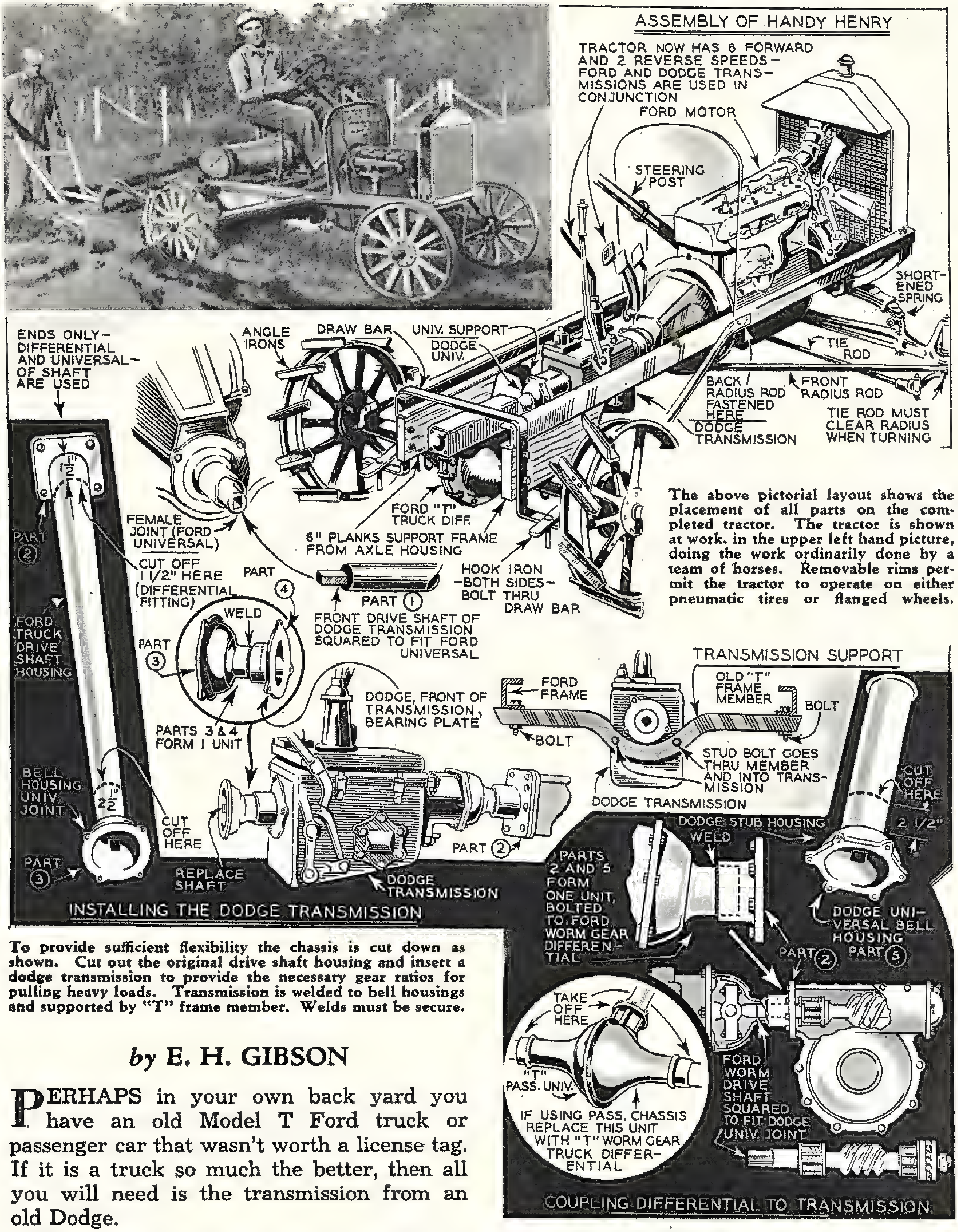
Any one of these surfboards can be very easily constructed in the home workshop simply by following carefully the plans illustrated here. In order to protect the wood for deterioration apply three coats of boat paint or spar varnish to all wood surfaces. Paint the canvas work in the following order: One coat of shellac, one of white lead and two of spar varnish. The colors are left to the builder's discretion.


3/4" SPRUCE STEAMED AND BENT UP
48"
12"
CHILDREN'S SURFBOARD


1"
1"
2"
14"
PLUG OVER BOLT HEAD
15"
39"
18"
18"
ALTERNATE WHITE PINE AND REDWOOD
3"
CUT OUTS
5/16" BOLTS
1 1/2"
LAMINATED SURFBOARD

The child's surfboard shown at left consists of a spruce board steam bent as shown. The laminated surfboard is built up of hollowed out sections of pine and redwood bolted together as shown here.

BUILD "HANDY HENRY"


ASSEMBLY OF HANDY HENRY
TRACTOR NOW HAS 6 FORWARD AND 2 REVERSE SPEEDS—FORD AND DODGE TRANSMISSIONS ARE USED IN CONJUNCTION
FORD MOTOR
STEERING POST
SHORTENED SPRING
TIE ROD
BACK RADIUS ROD FASTENED HERE
FRONT RADIUS ROD
DODGE TRANSMISSION
TIE ROD MUST CLEAR RADIUS WHEN TURNING
ANGLE IRONS
DRAW BAR
UNIV. SUPPORT
DODGE UNIV.
FORD "T" TRUCK DIFF.
6" PLANKS SUPPORT FRAME FROM AXLE HOUSING
HOOK IRON—BOTH SIDES—BOLT THRU DRAW BAR
FEMALE JOINT (FORD UNIVERSAL)
PART ①
FRONT DRIVE SHAFT OF DODGE TRANSMISSION SQUARED TO FIT FORD UNIVERSAL
ENDS ONLY—DIFFERENTIAL AND UNIVERSAL OF SHAFT ARE USED
1 1/2"
PART ②
FORD TRUCK DRIVE SHAFT HOUSING
CUT OFF 1 1/2" HERE (DIFFERENTIAL FITTING)
PART ④
PART ③
WELD
PARTS 3 & 4 FORM 1 UNIT
BELL HOUSING UNIV. JOINT
2 1/2"
CUT OFF HERE
PART ③
REPLACE SHAFT
DODGE, FRONT OF TRANSMISSION, BEARING PLATE
DODGE TRANSMISSION
PART ②
INSTALLING THE DODGE TRANSMISSION
TRANSMISSION SUPPORT
FORD FRAME
BOLT
OLD "T" FRAME MEMBER
BOLT
STUD BOLT GOES THRU MEMBER AND INTO TRANSMISSION
DODGE TRANSMISSION
DODGE STUB HOUSING
WELD
CUT OFF HERE
2 1/2"
PARTS 2 AND 5 FORM ONE UNIT, BOLTED TO FORD WORM GEAR DIFFERENTIAL
DODGE UNIVERSAL BELL HOUSING PART ⑤
PART ②
TAKE OFF HERE
"T" PASS. UNIV.
IF USING PASS. CHASSIS REPLACE THIS UNIT WITH "T" WORM GEAR TRUCK DIFFERENTIAL
FORD WORM DRIVE SHAFT SQUARED TO FIT DODGE UNIV. JOINT
COUPLING DIFFERENTIAL TO TRANSMISSION

The above pictorial layout shows the placement of all parts on the completed tractor. The tractor is shown at work, in the upper left hand picture, doing the work ordinarily done by a team of horses. Removable rims permit the tractor to operate on either pneumatic tires or flanged wheels.

To provide sufficient flexibility the chassis is cut down as shown. Cut out the original drive shaft housing and insert a dodge transmission to provide the necessary gear ratios for pulling heavy loads. Transmission is welded to bell housings and supported by "T" frame member. Welds must be secure.

In order to use a double transmission the worm drive shaft on the Ford must be squared to fit the Dodge universal joint. If a passenger chassis is used for tractor replace the "rear end" with one taken from a "T" truck. Since all parts are numbered on diagram they may be easily identified in assembly. Part "A" in one diagram and part "A" in another are same.

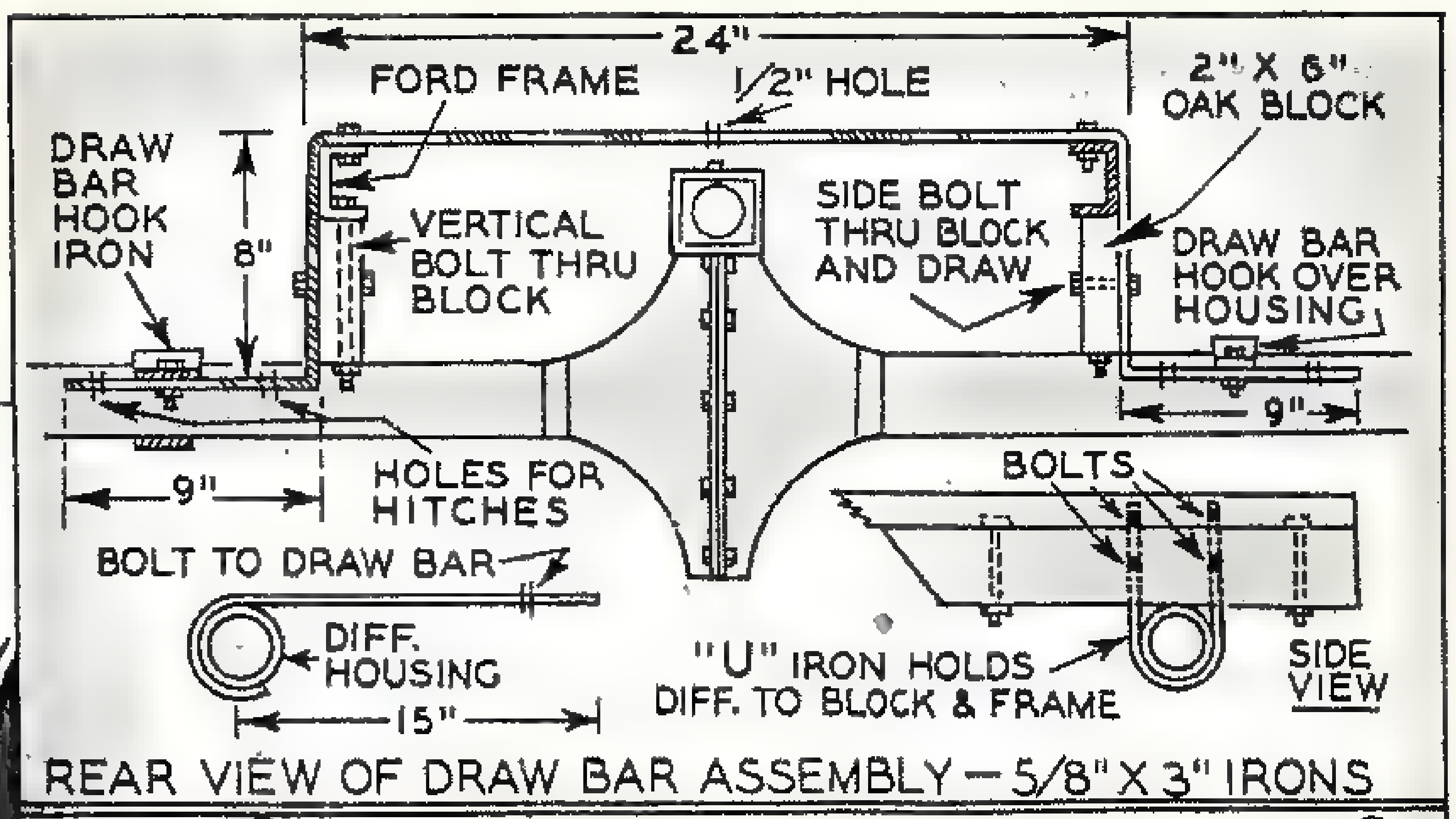
by E. H. GIBSON

PERHAPS in your own back yard you have an old Model T Ford truck or passenger car that wasn't worth a license tag. If it is a truck so much the better, then all you will need is the transmission from an old Dodge.

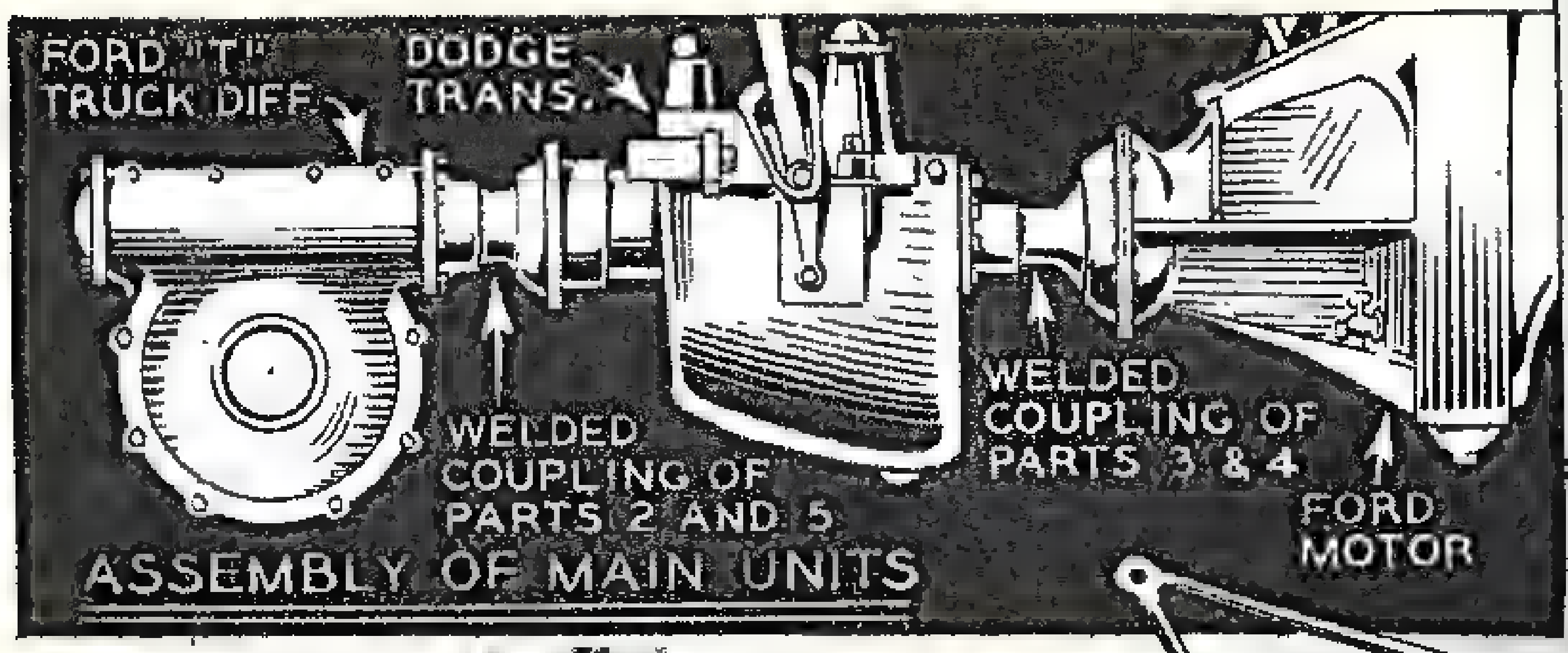
The tractor described here is capable of handling any two horse load, at a faster speed than horses and on nominal gas consumption. It should be noted that the plans have been

TRACTOR *for Twenty Dollars*

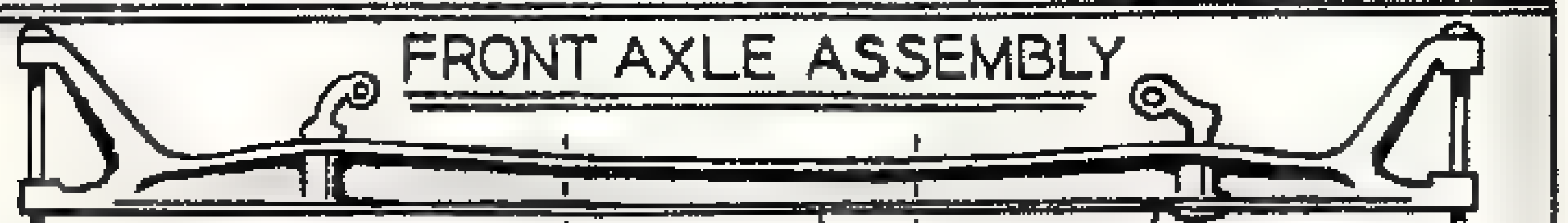
With T Fords available throughout the country any shop man can easily convert one into a practical tractor.

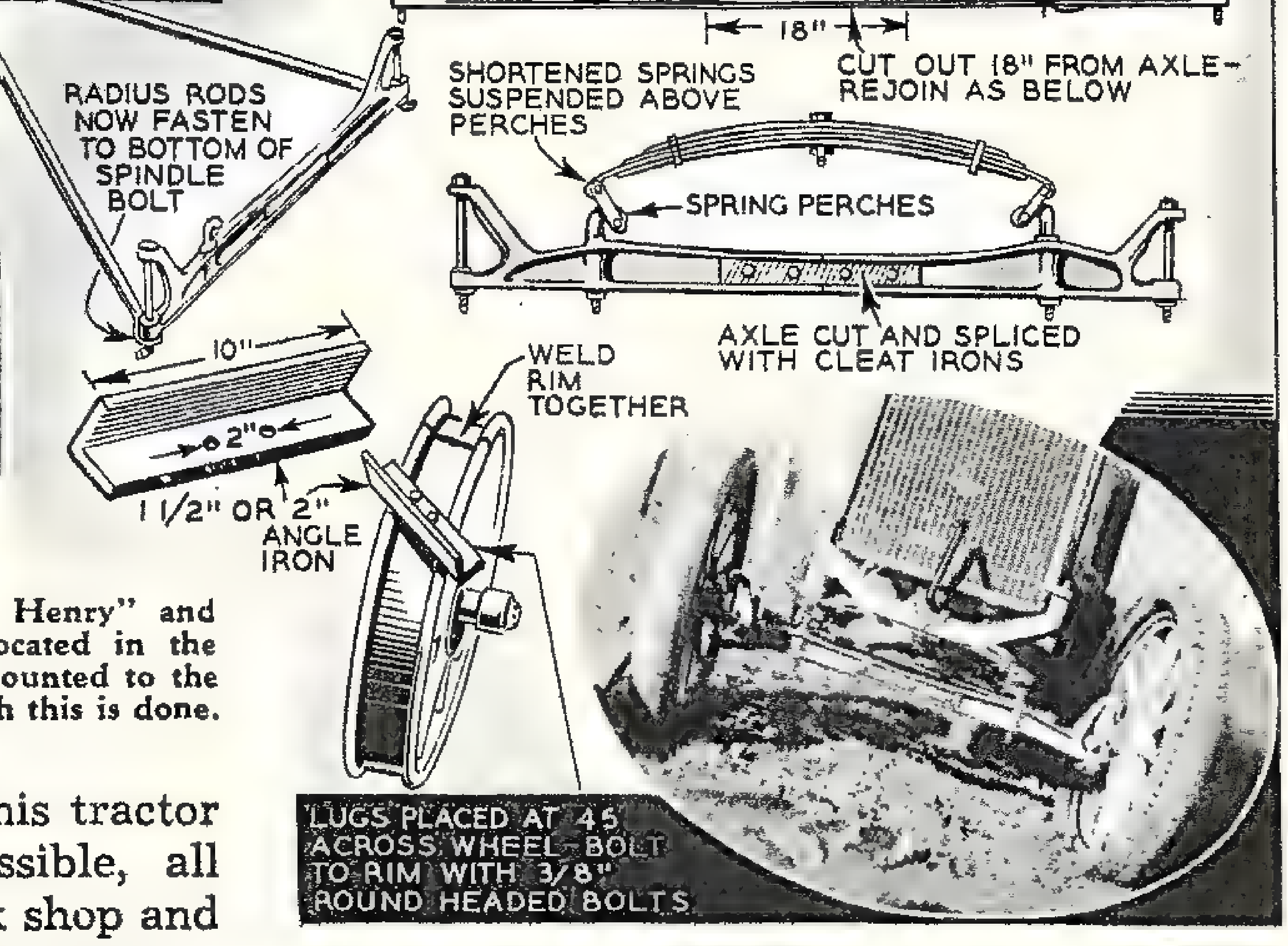

24"
FORD FRAME
1/2" HOLE
2" X 6" OAK BLOCK
DRAW BAR HOOK IRON
8"
VERTICAL BOLT THRU BLOCK
SIDE BOLT THRU BLOCK AND DRAW
DRAW BAR HOOK OVER HOUSING
9"
9"
HOLES FOR HITCHES
BOLTS
BOLT TO DRAW BAR
DIFF. HOUSING
15"
"U" IRON HOLDS DIFF. TO BLOCK & FRAME
SIDE VIEW

REAR VIEW OF DRAW BAR ASSEMBLY—5/8" X 3" IRONS


FORD "T" TRUCK DIFF.
DODGE TRANS.
WELDED COUPLING OF PARTS 2 AND 5
WELDED COUPLING OF PARTS 3 & 4
FORD MOTOR

ASSEMBLY OF MAIN UNITS


FRONT AXLE ASSEMBLY


18"
RADIUS RODS NOW FASTEN TO BOTTOM OF SPINDLE BOLT
SHORTENED SPRINGS SUSPENDED ABOVE PERCHES
CUT OUT 18" FROM AXLE—REJOIN AS BELOW
SPRING PERCHES
AXLE CUT AND SPLICED WITH CLEAT IRONS
10"
2"
1 1/2" OR 2" ANGLE IRON
WELD RIM TOGETHER
LUGS PLACED AT 45 ACROSS WHEEL—BOLT TO RIM WITH 3/8" ROUND HEADED BOLTS

The photo above shows the rear of "Handy Henry" and location of clevis holes. The draw bar is located in the center. Note manner in which differential is mounted to the chassis. The drawings depict the manner in which this is done.

The axle splice is shown above. Since eighteen inches are removed here it is necessary to shorten front springs, too. The radius rod is fastened to bottom of spindle bolts instead of on the top as it was formerly. The flanged rims are built up from old rims which have been welded together at split joint and lugs bolted on to provide traction in soft earth.

worked out in an effort to build this tractor without undue cost. Where possible, all fittings are made in your own work shop and it is not necessary to seek the aid of an expert machinest at any time. There are, however, several joints that must be welded. If the builder will note these and then have them all welded at once the welder will no doubt make a special rate for the complete job.

This little tractor is not an experiment, but a proven product that will, under normal conditions, handle any farm job done by two good horses and if a good motor is used it will easily handle a three horse load. It is not advisable, however, to overload the tractor as this would slow down the engine and reduce its horsepower output.

The tractor is made from parts of a Model T Ford truck and an old Dodge transmission. Any make of transmission may be used but the old Dodge is preferred for its rugged build and ability to stand up under long grinds in lower gear. The shifting on this model Dodge is just reversed from standard, in other words low gear is where reverse is on later model cars. If you do not have a Ford truck, but do have a passenger car, it will then be necessary for you to obtain a Ford truck differential. Any wrecking yard should supply one with low gears for not more than five dollars. The Dodge transmission should be bought for about $2.50.

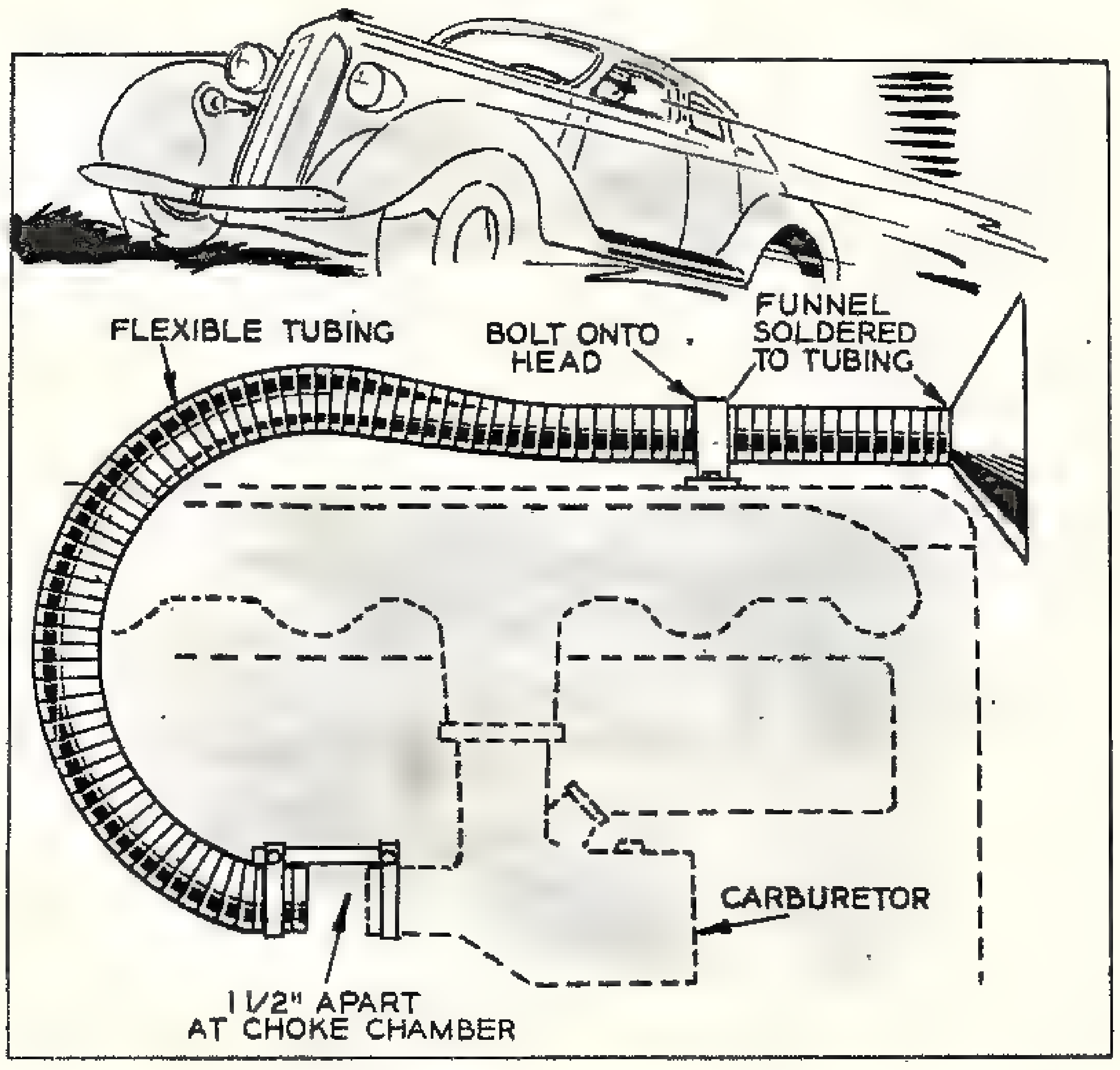
A regular T model passenger car frame is used and the first job is to strip it of all unnecessary parts, then block it up and remove the rear end which will later be replaced by the truck differential. A good radiator and motor are the important parts of the tractor and to aid in cooling a water pump may be installed. Next block up the front end and remove the front wheel assembly and spring. This is then dismantled. The object here is to narrow it up 16 inches to permit shorter turning. With a yard stick or tape find the exact center of the front axle.

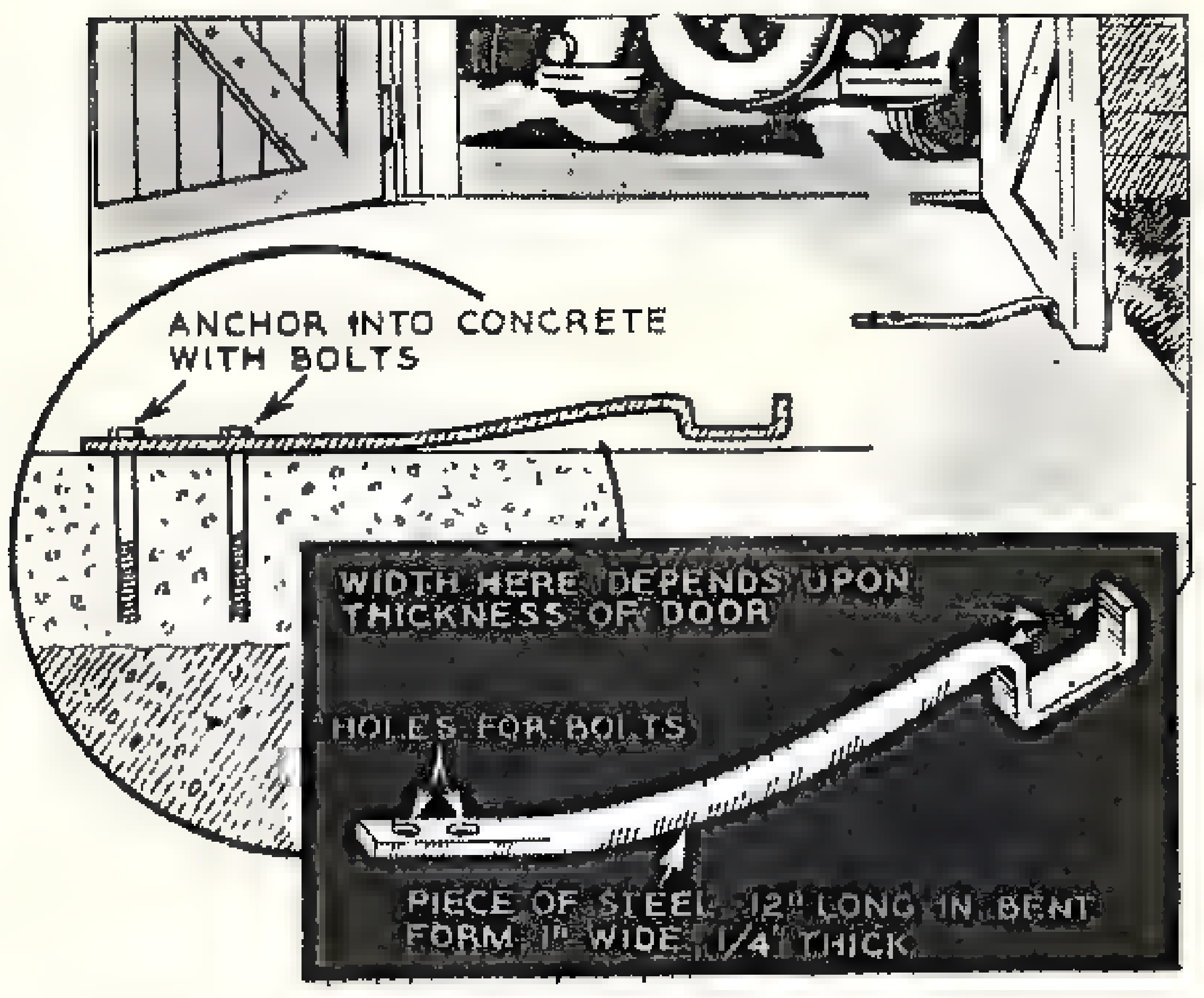
[*Continued on page* 120]

SUMMER SUGGESTIONS FOR MOTORISTS

Tubing from Fan to Choke Saves Gas

A SIMPLE device that will save gas on many cars consists of a length of flexible tubing mounted in the manner shown so as to send a constant rush of air into the choke chamber. On the one end of the tubing attach a metal funnel so that air coming into the engine through the radiator will be forced through the tube. Attach the device firmly to the engine head, using a clamp made of sheet metal. Another bracket is attached to the opposite end and directed so that the tube may be fastened just 1½ inches from the choke chamber.—J. Vanderton.


FLEXIBLE TUBING
BOLT ONTO HEAD
FUNNEL SOLDERED TO TUBING
CARBURETOR
1 1/2" APART AT CHOKE CHAMBER

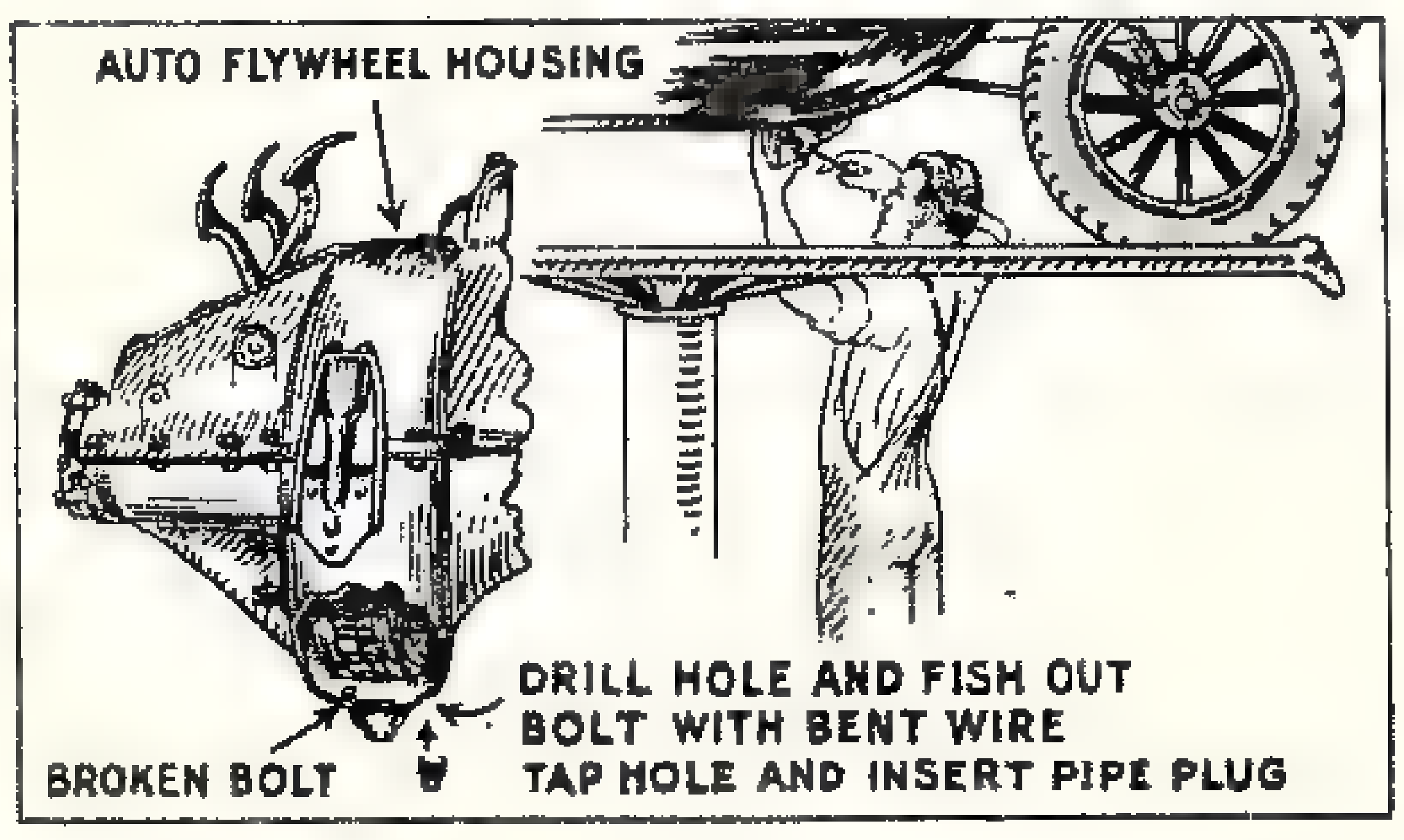

ANCHOR INTO CONCRETE WITH BOLTS
WIDTH HERE DEPENDS UPON THICKNESS OF DOOR
HOLES FOR BOLTS
PIECE OF STEEL 12" LONG IN BENT FORM 1" WIDE 1/4 THICK

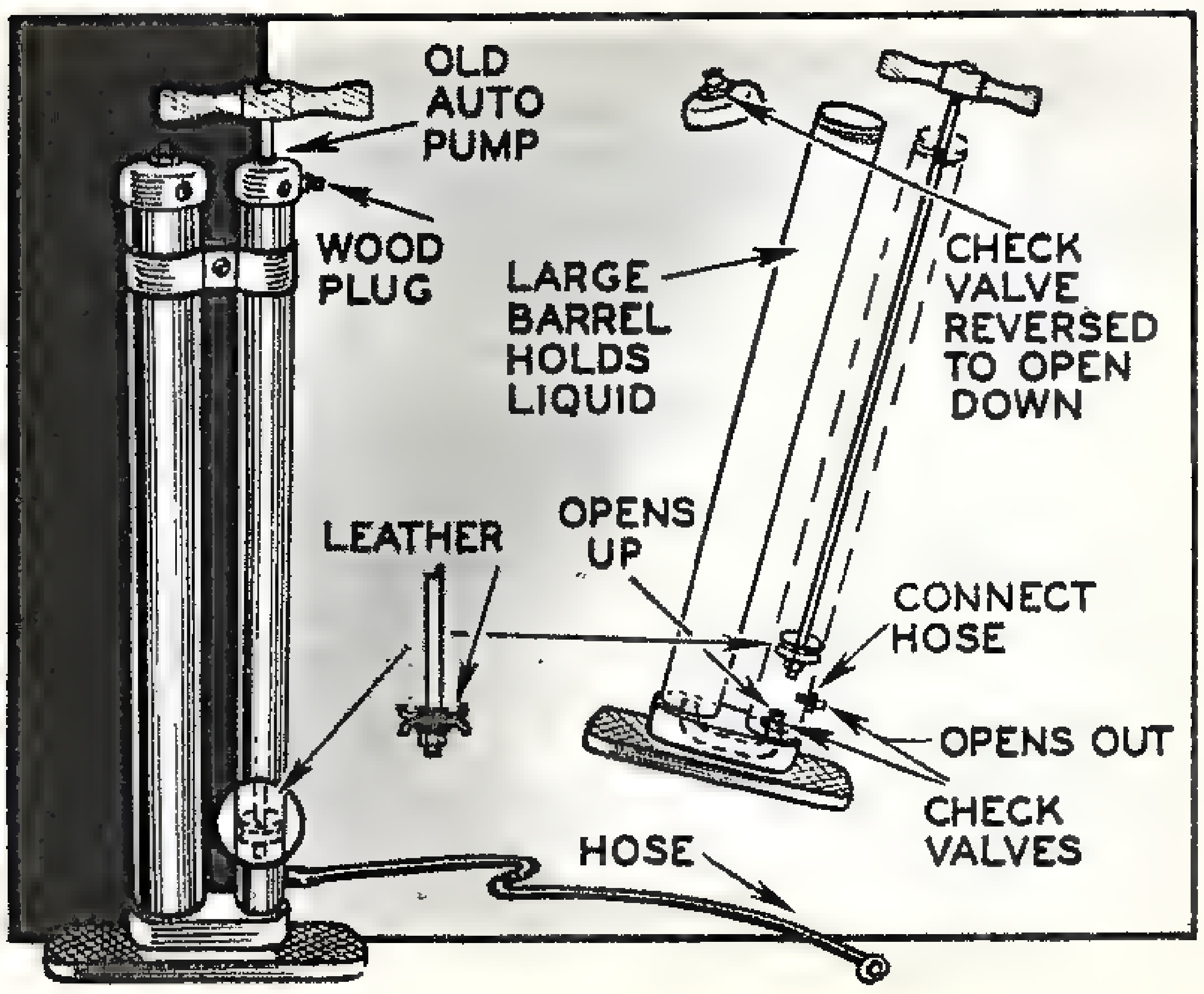
Bolted Steel Bar Holds Garage Doors Open

A CONVENIENT method of holding the garage door open while the car is being put away recommends itself to private garage owners. It is made by bending a steel bar to the shape shown and then cementing or anchoring it in the driveway with machine bolts. The bar is bent from a strip of flexible metal.—V. C. Childs.

Plug Allows Removal of Stray Flywheel Bolts

MOTORISTS constantly annoyed by broken and loose bolts falling into the flywheel housings of their cars can now remove them without too much trouble or expense. Bore a hole in the bottom of the flywheel housing slightly larger than the diameter of a bolt, tap the hole and insert a pipe plug.—D. L. Wells.

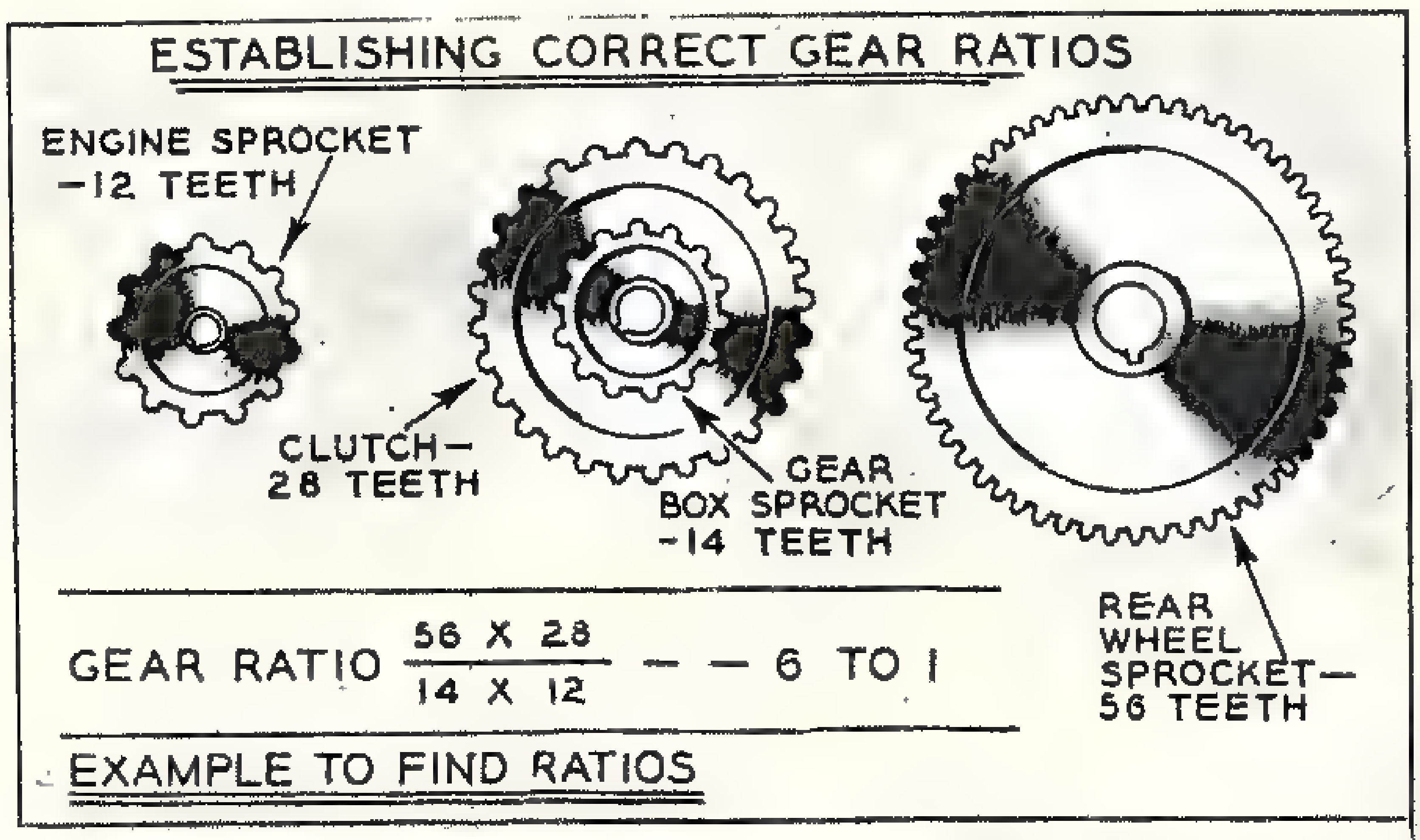

AUTO FLYWHEEL HOUSING
DRILL HOLE AND FISH OUT BOLT WITH BENT WIRE
TAP HOLE AND INSERT PIPE PLUG
BROKEN BOLT


OLD AUTO PUMP
WOOD PLUG
LARGE BARREL HOLDS LIQUID
CHECK VALVE REVERSED TO OPEN DOWN
LEATHER
OPENS UP
CONNECT HOSE
OPENS OUT
CHECK VALVES
HOSE

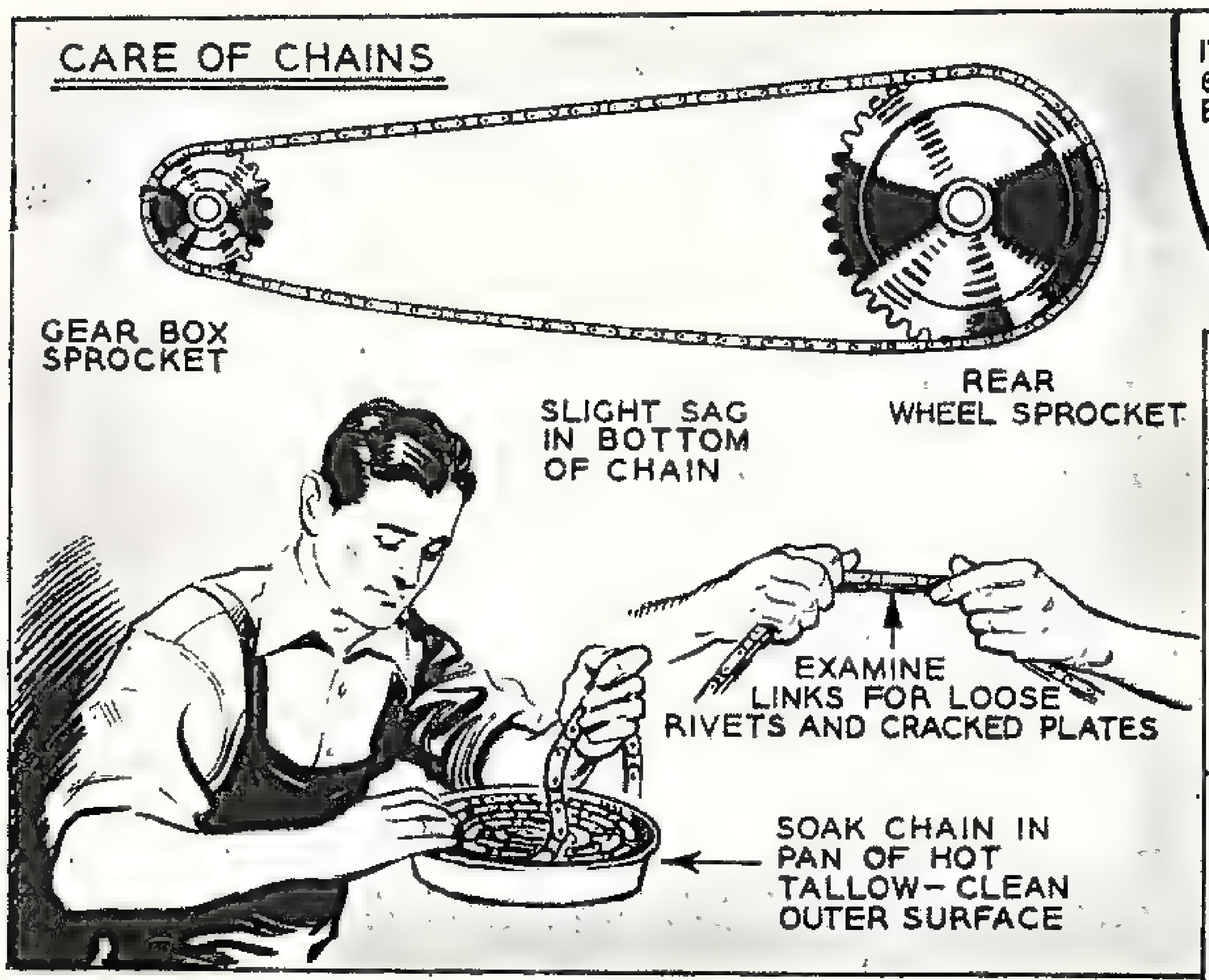
Fire Fighter Made from Old Pump

AN OLD tire pump can be converted, in little time, into a practical fire extinguisher. Take the pump apart and connect up the two barrels through a length of tubing so that the one tube leads into a check valve in the manner shown. The plunger is removed from one of the barrels and a check valve inserted in the opening in the cap. A final check valve is then mounted in the bottom of the other barrel to which the hose is attached. Drive a wooden plug in the top vent hole in the pump barrel cap so that no leaks result. Extinguishing liquid is placed in the larger barrel and device is ready for use.

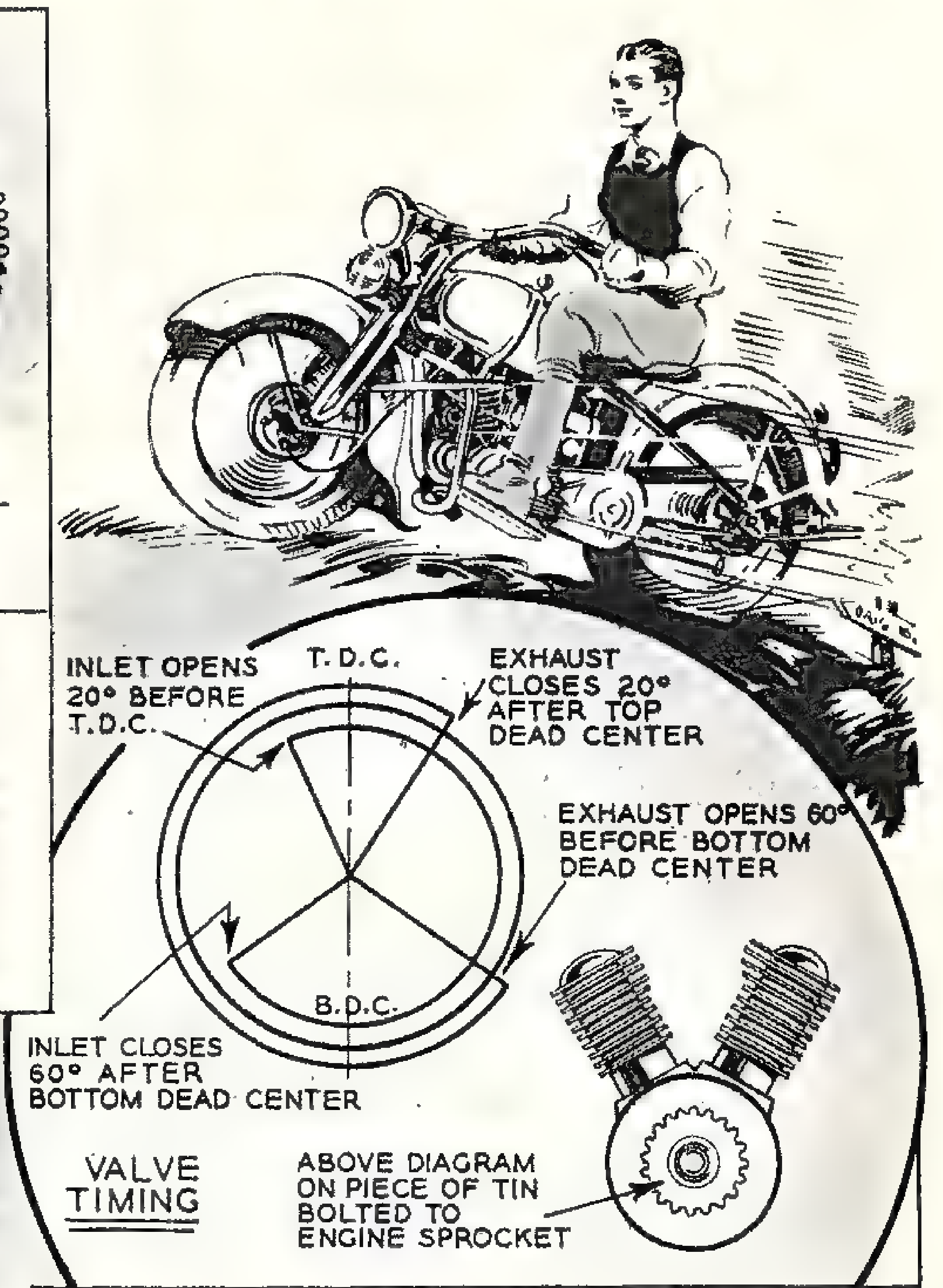
TIPS FOR MOTORCYCLISTS


ESTABLISHING CORRECT GEAR RATIOS
ENGINE SPROCKET -12 TEETH
CLUTCH—28 TEETH
GEAR BOX SPROCKET -14 TEETH
REAR WHEEL SPROCKET—56 TEETH
GEAR RATIO $\frac{56 \times 28}{14 \times 12}$ — — 6 TO 1
EXAMPLE TO FIND RATIOS

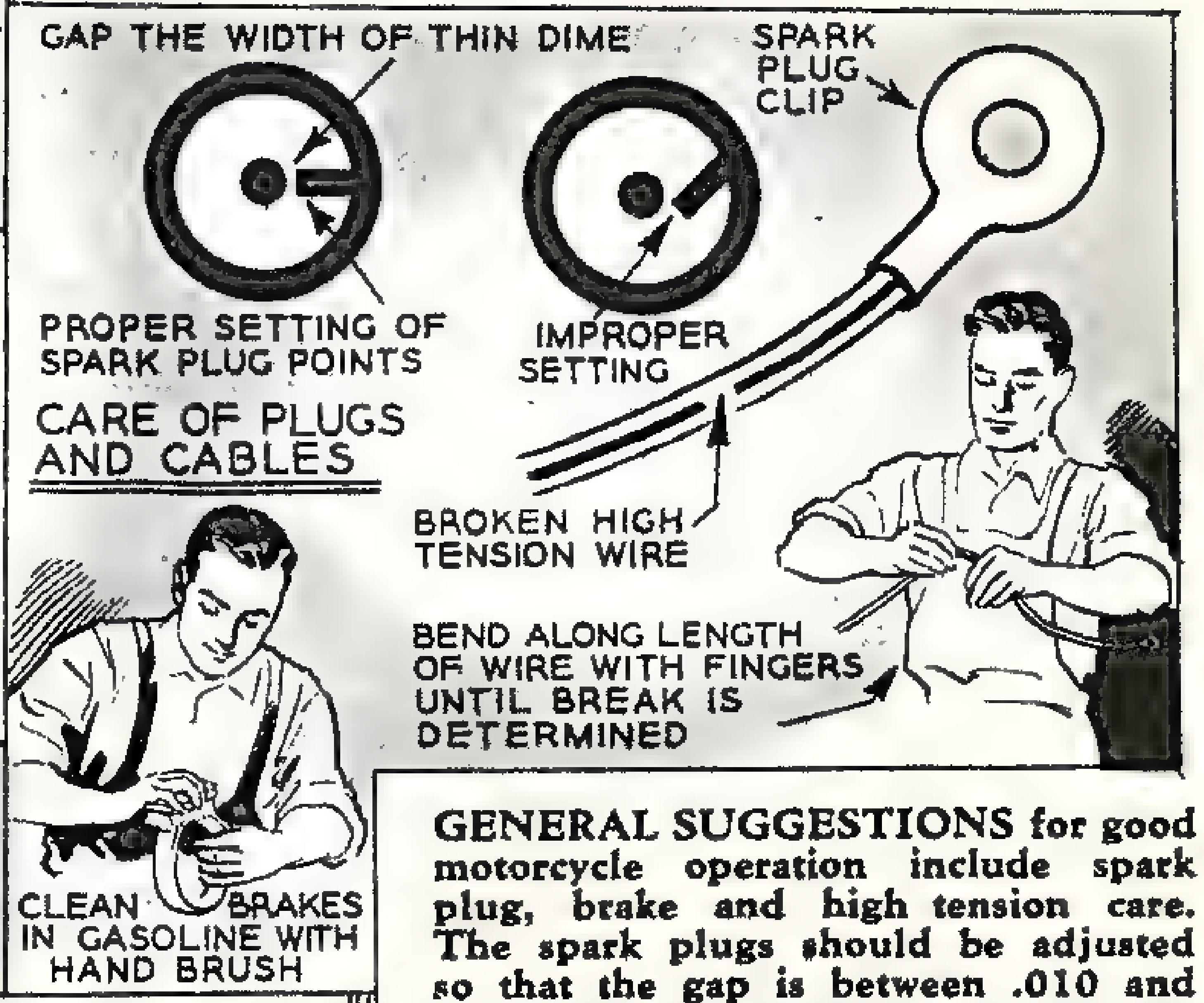
GEAR RATIOS decide speed and power. The ratio of your motorcycle can be determined. Count the number of teeth on the engine and gear box sprocket then multiply these together. Next, count the teeth on the rear and clutch sprocket and multiply them. Dividing the last figures by the first you will have the gear ratio as examplified above. Knowing the gear ratio you can find the different ratios required for solo and sidecar use. If a 5 to 1 ratio is required multiply the number of teeth in the rear sprocket by the number in the clutch. Dividing these figures by teeth in the gear box sprocket times desired ratio number (5) you know the number of teeth required for the engine sprocket.


CARE OF CHAINS
GEAR BOX SPROCKET
REAR WHEEL SPROCKET
SLIGHT SAG IN BOTTOM OF CHAIN
EXAMINE LINKS FOR LOOSE RIVETS AND CRACKED PLATES
SOAK CHAIN IN PAN OF HOT TALLOW—CLEAN OUTER SURFACE

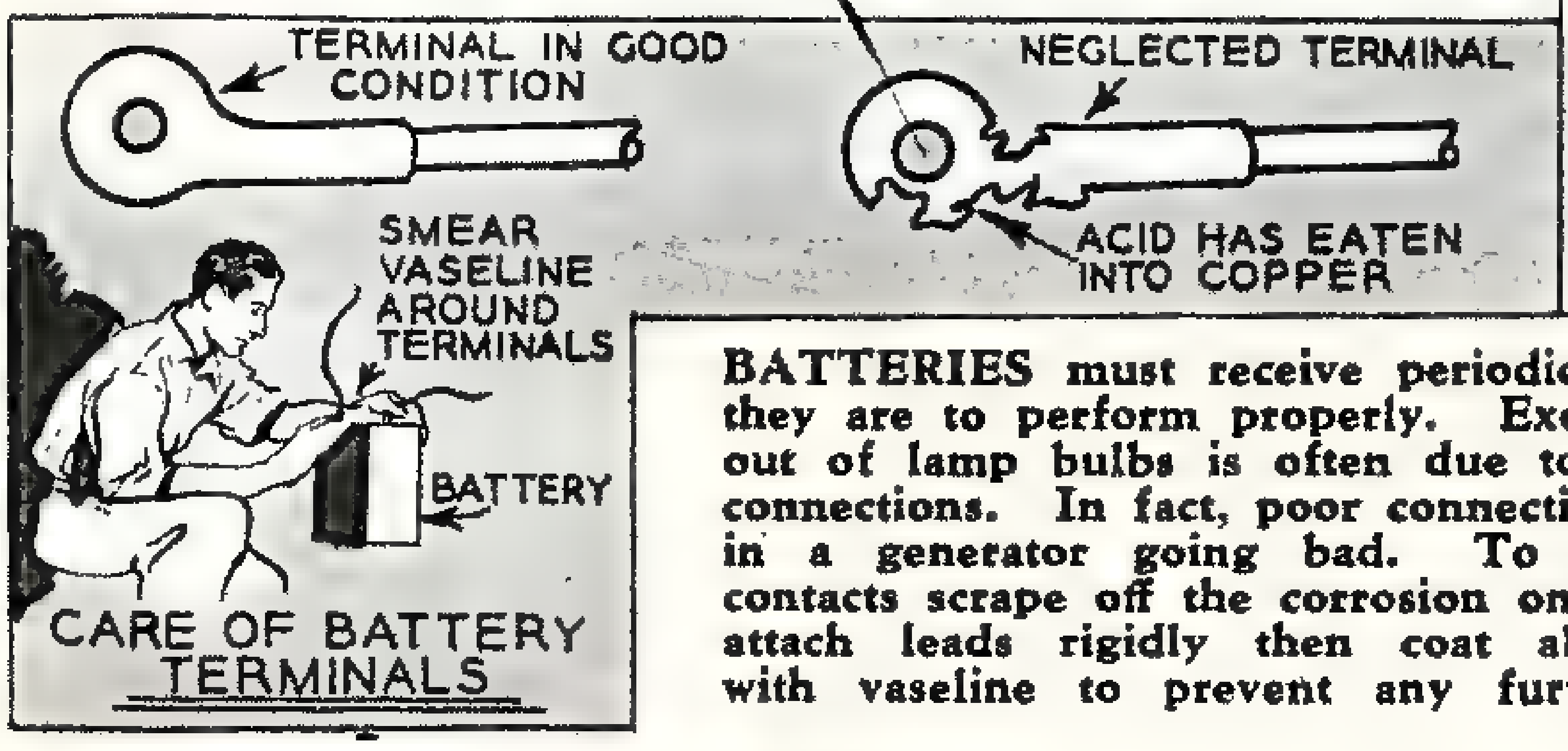
CHAINS are a very important part of any motorcycle. No motorcycle should be driven more than one thousand miles without relubricating the chain drive. To do this requires that the chain be removed from the motorcycle and cleaned thoroughly in gasoline, then wiped perfectly dry. This done melt enough tallow in a pan to completely cover the chain. Allow the chain to remain in the liquid until all bearings are penetrated by the tallow. The surplus grease is then wiped off and the chain examined for cracked side plates or loose rivets. In mounting chain on sprockets allow a slight sag, but not too much or it may work off the sprocket and whip itself to pieces.


INLET OPENS 20° BEFORE T.D.C.
T.D.C.
EXHAUST CLOSES 20° AFTER TOP DEAD CENTER
EXHAUST OPENS 60° BEFORE BOTTOM DEAD CENTER
B.D.C.
INLET CLOSES 60° AFTER BOTTOM DEAD CENTER
VALVE TIMING
ABOVE DIAGRAM ON PIECE OF TIN BOLTED TO ENGINE SPROCKET

VALVE TIMING, for best results, can be determined readily by copying the above diagram on a tin disc and attaching it to the outside of the engine sprocket. This done bring the piston to top dead center and place the diagram in the same position. You can then put a center punch mark on the crank case to correspond with it, push in the gears and continue on to the next in the same manner. Arrange inlet valve to open 20 degrees before top dead center and close 60 degrees after. Exhaust opens 60 degrees before and closes 30 degrees after.

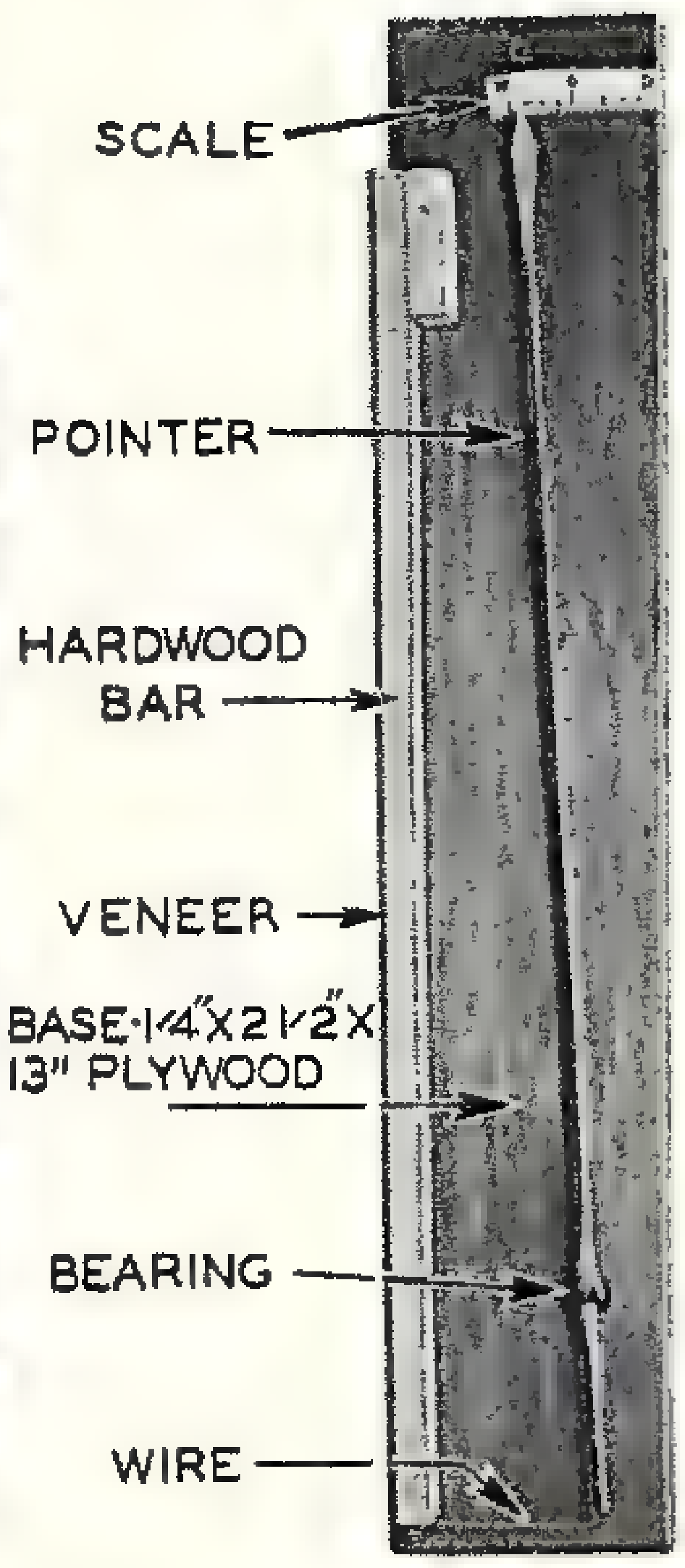

GAP THE WIDTH OF THIN DIME
SPARK PLUG CLIP
PROPER SETTING OF SPARK PLUG POINTS
IMPROPER SETTING
CARE OF PLUGS AND CABLES
BROKEN HIGH TENSION WIRE
BEND ALONG LENGTH OF WIRE WITH FINGERS UNTIL BREAK IS DETERMINED
CLEAN BRAKES IN GASOLINE WITH HAND BRUSH

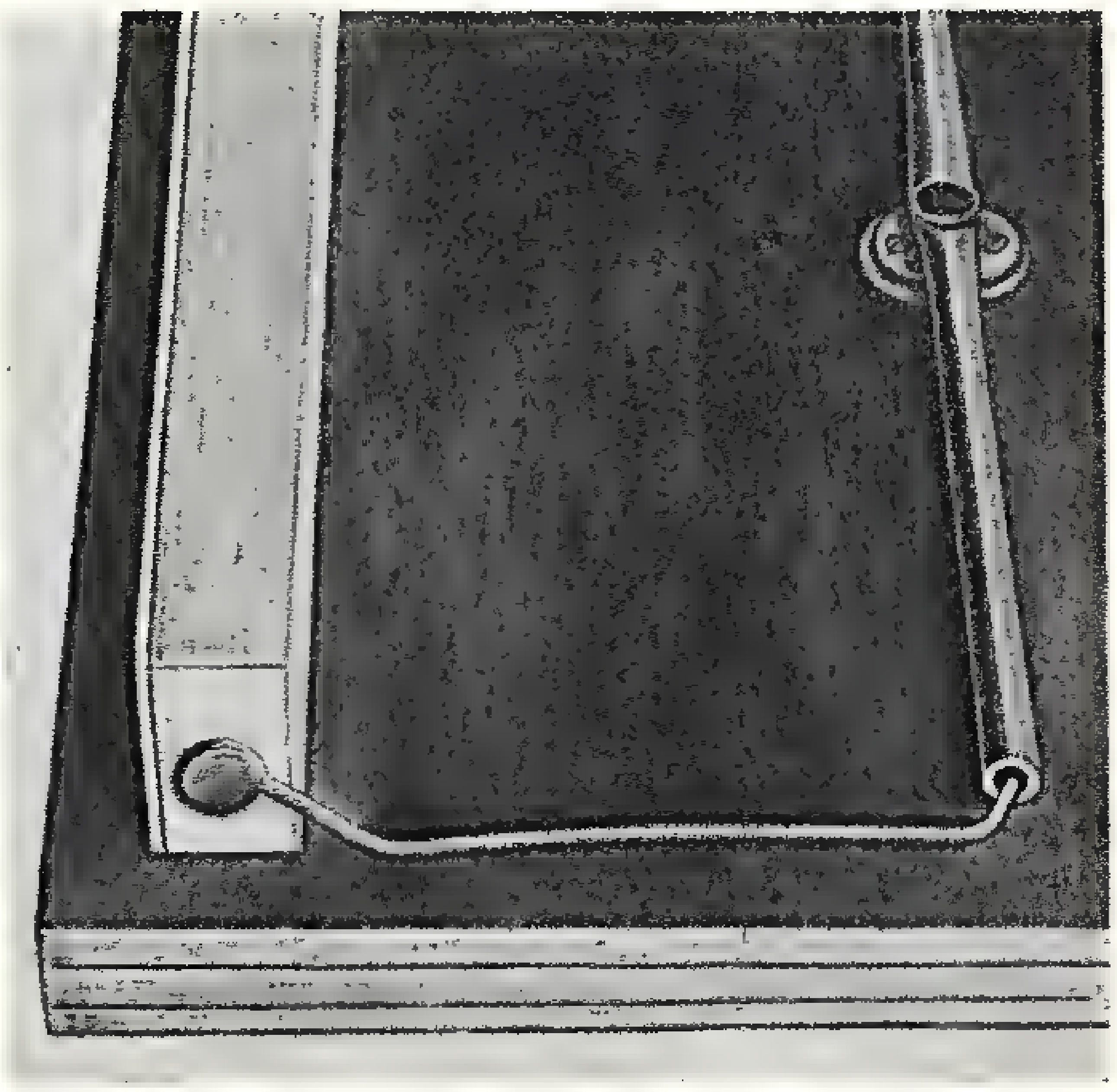
GENERAL SUGGESTIONS for good motorcycle operation include spark plug, brake and high tension care. The spark plugs should be adjusted so that the gap is between .010 and .014 inch, the thickness of a 10 cent piece. When engine misses at high speeds trouble is due to gap on a plug being too wide. Broken high tension leads rob engine of power and should be checked by bending. Greasy brake linings should be cleaned with a small brush and gasoline.


TERMINAL IN GOOD CONDITION
NEGLECTED TERMINAL
ACID HAS EATEN INTO COPPER
SMEAR VASELINE AROUND TERMINALS
BATTERY
CARE OF BATTERY TERMINALS

BATTERIES must receive periodical attention if they are to perform properly. Excessive burning out of lamp bulbs is often due to loose battery connections. In fact, poor connections may result in a generator going bad. To insure perfect contacts scrape off the corrosion on the terminals, attach leads rigidly then coat all metal parts with vaseline to prevent any further corrosion.

Moisture Gauge Measures Humidity in the Home





With this simple moisture gauge the humidity in any room may be determined. The photo at left shows the completed instrument in operation while the above photo shows the manner in which the veneer strip operates the arm and, in turn, the pointer.

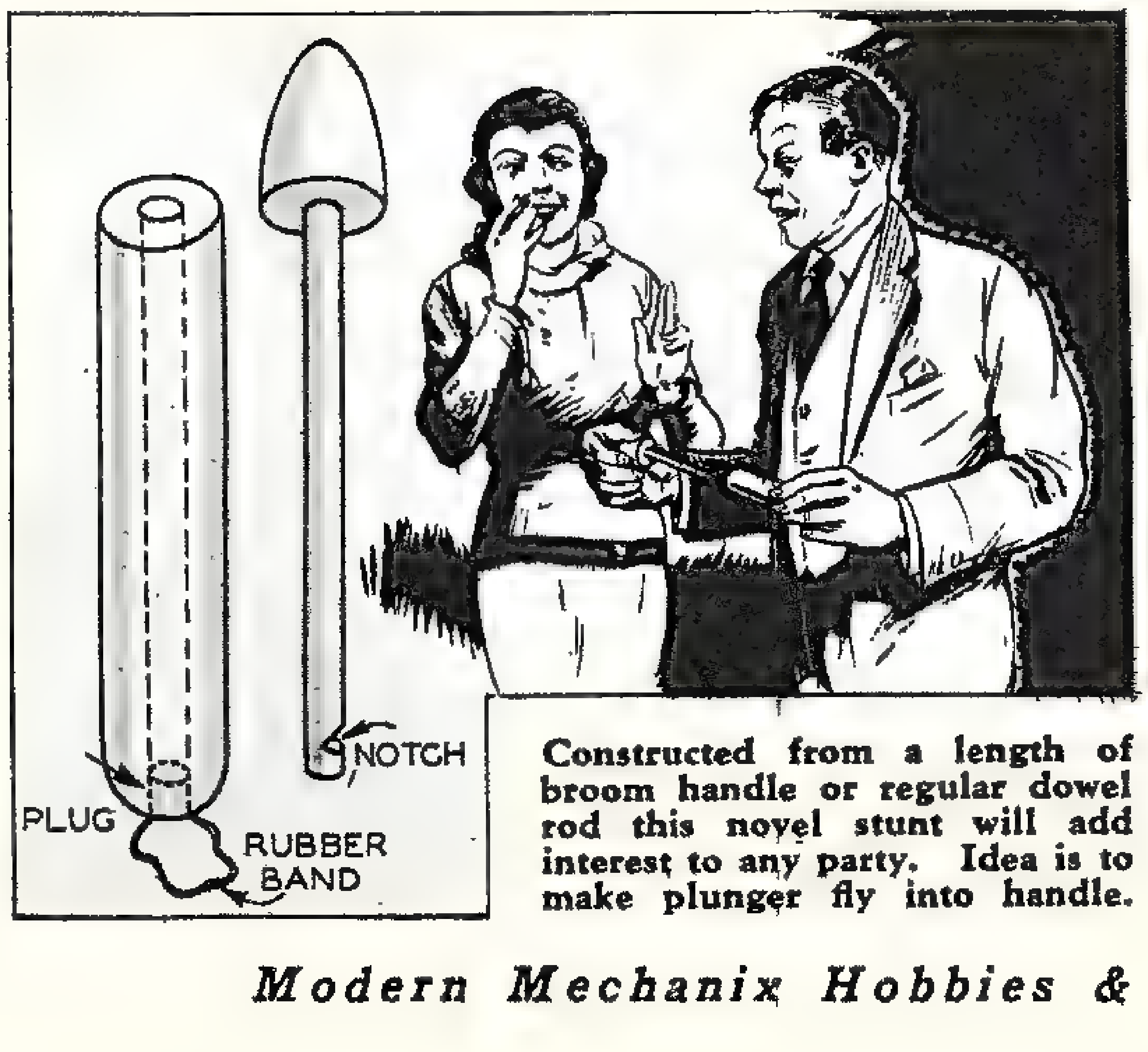
BY KEEPING the air in your home sufficiently moist you can avoid colds, prevent furniture from becoming too dry and improve the efficiency of your heating system. In order to do this a simple moisture gauge is required and this may be built by anyone from odds and ends found about the home.

The base of the gauge is a piece of plywood measuring ¼"x2½"x13". This may be finished by staining if desired. The heart of the instrument is a strip of hardwood to which is glued a layer of oak veneering. The veneer absorbs moisture at a different rate as compared to the hardwood strip making the bar bend one way. When the bar dries it bends in the opposite direction. The hardwood strip measures ¼"x½"x11¾" and to it is attached the strip of veneer with the grain running crosswise. Nail or screw the strip to a small block of wood and fasten this in turn to the base.

The pointer is made from a straight piece of wire 12" long. One end is hammered flat and filed to a point like the hand on a timepiece. At the opposite end of the pointer, 2" from the end, flatten the wire sufficiently so that a small hole may be drilled to receive a nail which acts as the bearing for the pointer. File the end of the wire opposite the point flat and make a depression in it with a sharp drill. Mount the pointer parallel to the bar and about 1½" to the right. A stiff wire is attached to the wood strip and bent so that it rests in the depression of the pointer.

Jumping Plug Puzzles Party Guests

THERE is nothing that will add more life to a party than this jumping plunger. Offered to a friend, he cannot make the plunger fly into the handle although he is told to hook the rubber band to the notched end of the plunger in order to accomplish the trick. The secret lies in the torpedo shaped plunger knob. Instead of actually catching the rubber band with the notched stick the operator merely lets the knob pass through the finger tips rapidly. The illusion is almost perfect. Make the handle from a wooden dowel 1" in diameter and 3" long and carve the knob acorn shape as shown. Complete by attaching ¼"x2¾" dowel to knob.



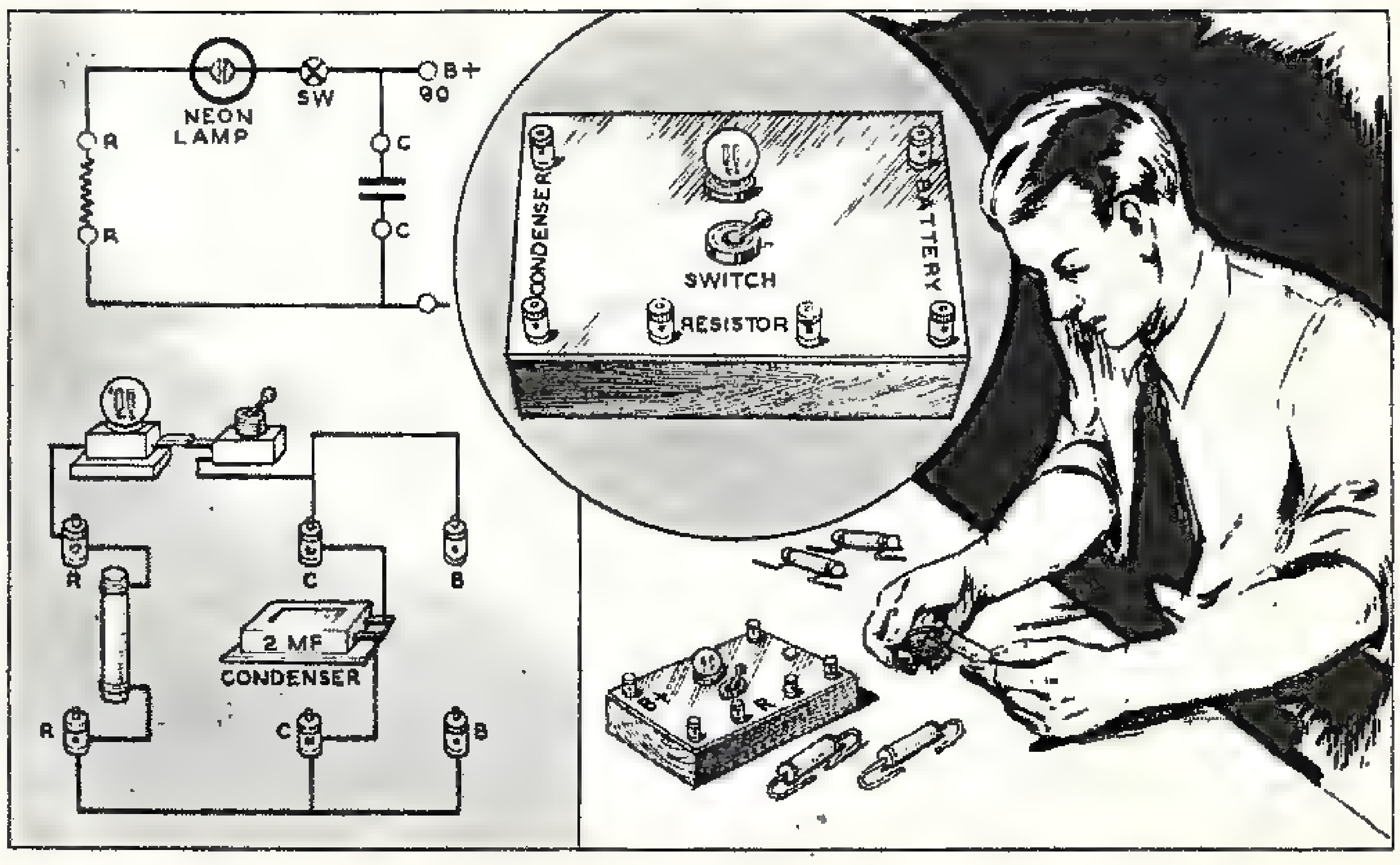
Constructed from a length of broom handle or regular dowel rod this novel stunt will add interest to any party. Idea is to make plunger fly into handle.

RADIO SPARKS

Neon Lamp Used In Simple Resistance-Capacity Tester

THIS handy multiple purpose tester will make a valuable addition to the experimenter's workbench and it costs practically nothing to build. Secure a neon bulb with standard lamp base and wire it up in the manner shown. A small wooden box may be used for the case; switch, terminals and socket being mounted on the top.

To use the tester for measuring an unknown resistance connect a known resistance to terminals R-R, for example 50,000 ohms and a 2 mfd. condenser to C-C. Open switch and connect 90 volts of B current to terminals B-B. Allow the battery to remain connected for a few moments then disconnect it and close the switch. The neon lamp will glow until the condenser has completely discharged through the 50,000 ohm resistance.



Costing less than one dollar to build, this simple tester is valuable in testing the capacity of condensers, polarity of currents, value of unknown resistors and the locating of radio frequency currents in radio receiver circuits.

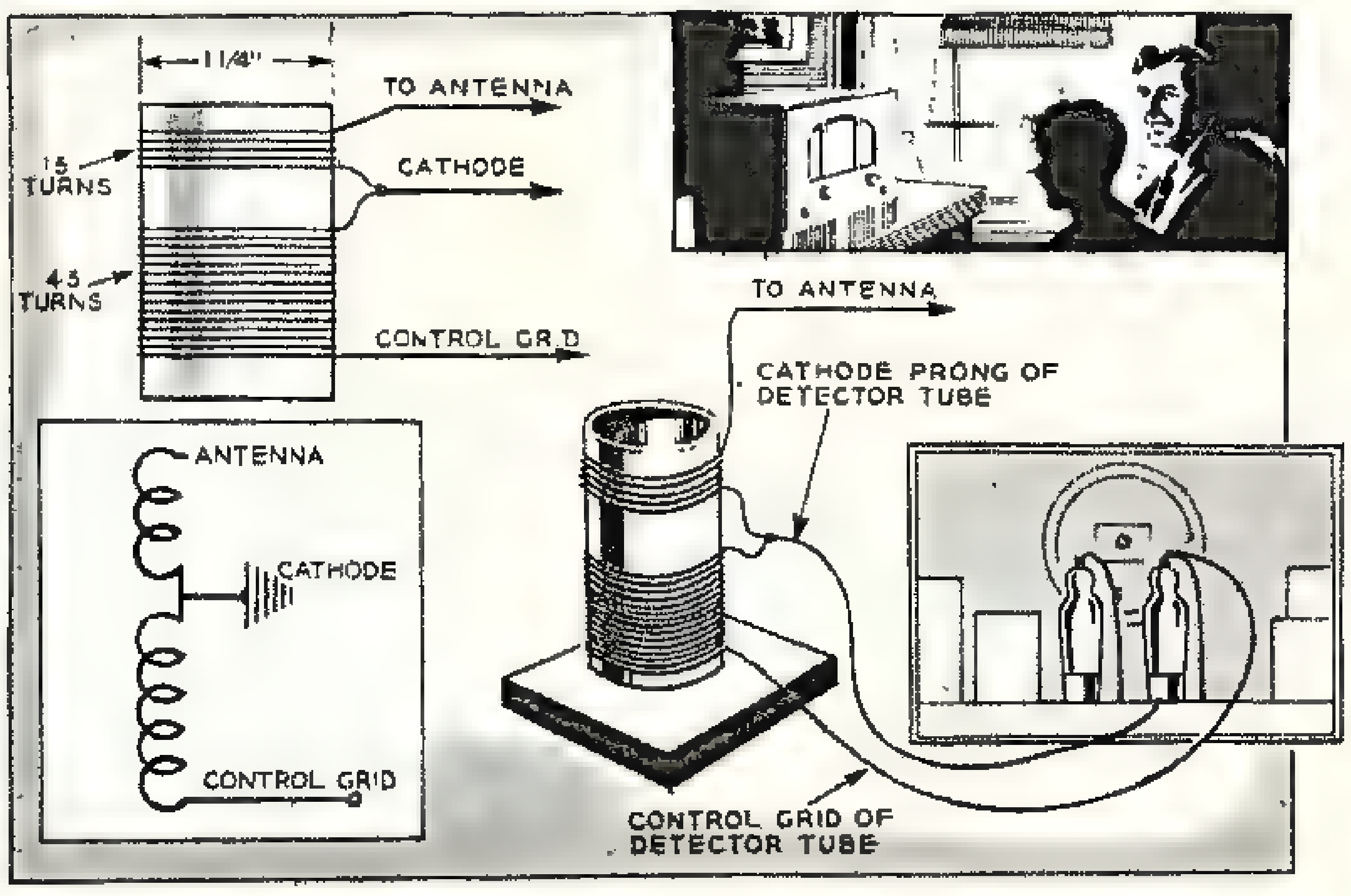
To use the tester to measure resistance take a slow count while the lamp glows and use this number as a standard. For example: If the count is ten for a 50,000 ohm resistance it will be twenty for a 100,000 ohm size or just five for a 25,000 ohm resistor.

To measure the capacity of an unknown condenser connect it to terminals C-C and just reverse the method used for testing for resistance. For instance: Since you know the ccunts for a 50,000 ohm resistance with a 2 mfd. condenser is ten and when this unknown capacity is but five it must be a 1 mfd. condenser.

To identify current connect leads to terminals R and C attaching these, in turn, to the current supply you wish to test. If the current is direct one of the electrodes in the neon bulb will glow brighter than the other indicating the positive side of the line. To check R.F. currents connect a 3-inch diameter 2-turn wire loop to R-R and a C battery to B-B. The lamp will glow when loop is brought into R.F. field.

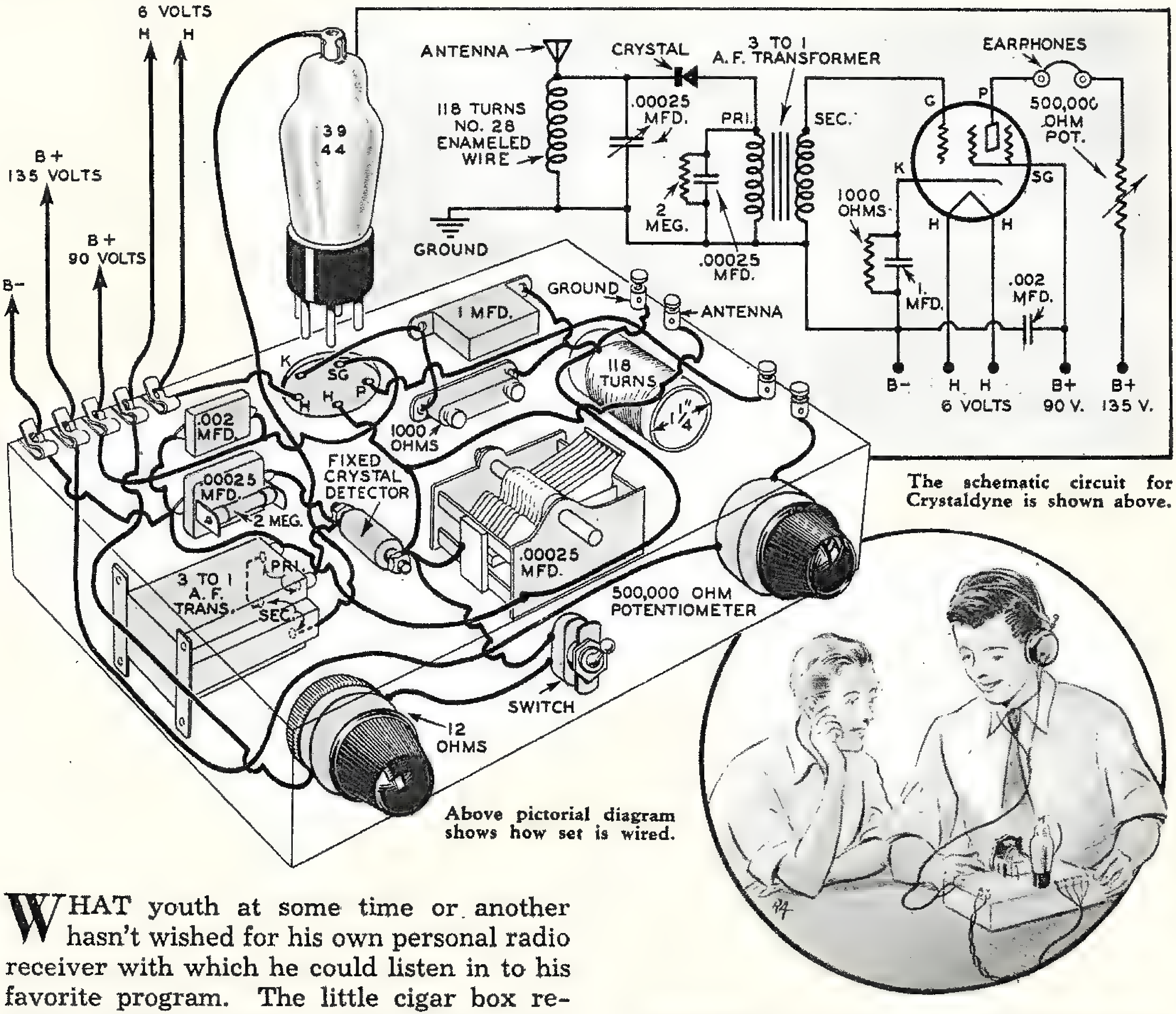
Shortwave Attachment Easily Made

THIS simple attachment will bring in police calls on many types of radio receivers intended only for broadcast reception. Wind a 15-turn and 45-turn coil on a 1¼-inch diameter coil form, connecting the inside leads to the set chassis. Connect the top of the smaller coil to the antenna and the bottom lead to the control grid of the detector tube. Tune in stations in the usual manner only dialing more slowly.



Attached to the detector tube of most electric radios this simple coil device will bring in police broadcasts. While it will work on many sets it is not guaranteed to work on all.

"Crystaldyne" A CIGAR BOX RECEIVER


6 VOLTS
H H
B+ 135 VOLTS
B+ 90 VOLTS
B−
39
44
K
SG
H
H
P
.002 MFD.
.00025 MFD.
2 MEG.
FIXED CRYSTAL DETECTOR
1000 OHMS
1 MFD.
GROUND
ANTENNA
118 TURNS
1¼"
3 TO 1 A. F. TRANS.
PRI.
SEC.
.00025 MFD.
500,000 OHM POTENTIOMETER
SWITCH
12 OHMS
ANTENNA
118 TURNS NO. 28 ENAMELED WIRE
GROUND
CRYSTAL
3 TO 1 A. F. TRANSFORMER
EARPHONES
.00025 MFD.
PRI.
SEC.
2 MEG.
.00025 MFD.
G
P
K
SG
H
H
1000 OHMS
1. MFD.
.002 MFD.
500,000 OHM POT.
B−
H H
6 VOLTS
B+ 90 V.
B+ 135 V.

The schematic circuit for Crystaldyne is shown above.

Above pictorial diagram shows how set is wired.

Constructed from junk parts this novel cigar box radio can be built at practically no cost. Either batteries or a B Power Supply Unit can be used to furnish current for the receiver.

WHAT youth at some time or another hasn't wished for his own personal radio receiver with which he could listen in to his favorite program. The little cigar box receiver described here was designed by a high school student just for this purpose. Extremely simple in construction the set possesses unusual tone quality through the use of a fixed crystal detector feeding into a type 39 or 44 Pentode tube. On local stations the set has sufficient volume to operate a small loudspeaker and on distant stations earphones may be used.

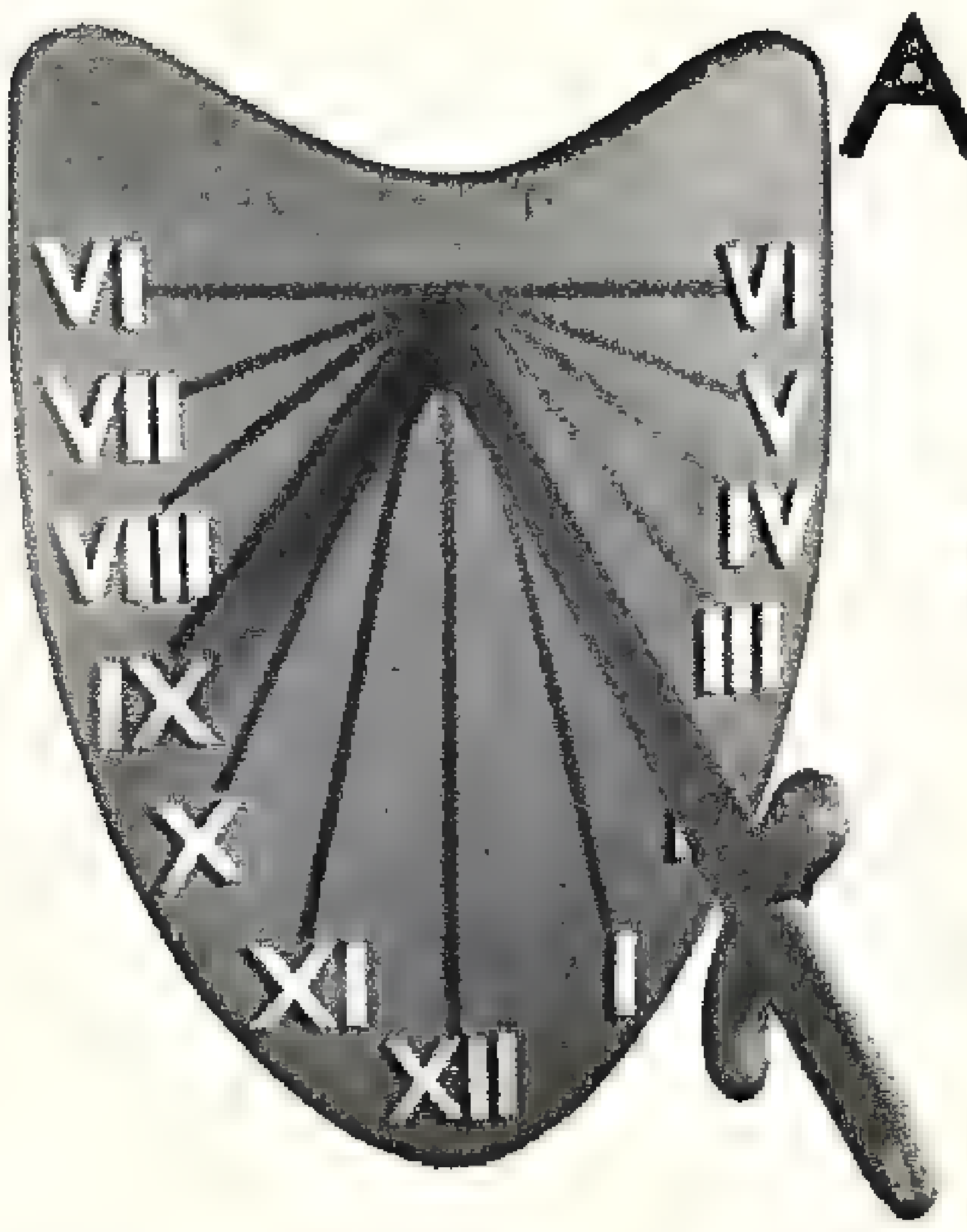
Except for the tube and crystal the set costs practically nothing to build. Parts from old battery sets were used to supply the necessary materials for building the "Crystaldyne." A cigar box served as an excellent chassis; all parts being mounted inside and readily accessible by raising the lid. The tube and tuning condenser are the only exposed parts and are mounted on top to add balance to the set.

The A. F. transformer and coil form are attached to the side of the cigar box with short brass machine screws. Three holes drilled in the front of the box provide a mounting for the switch, 12 ohm filament rheostat and 500,000 ohm potentiometer. Fahnstock clips are mounted along the rear of the cigar box to allow for connection to the power supply.

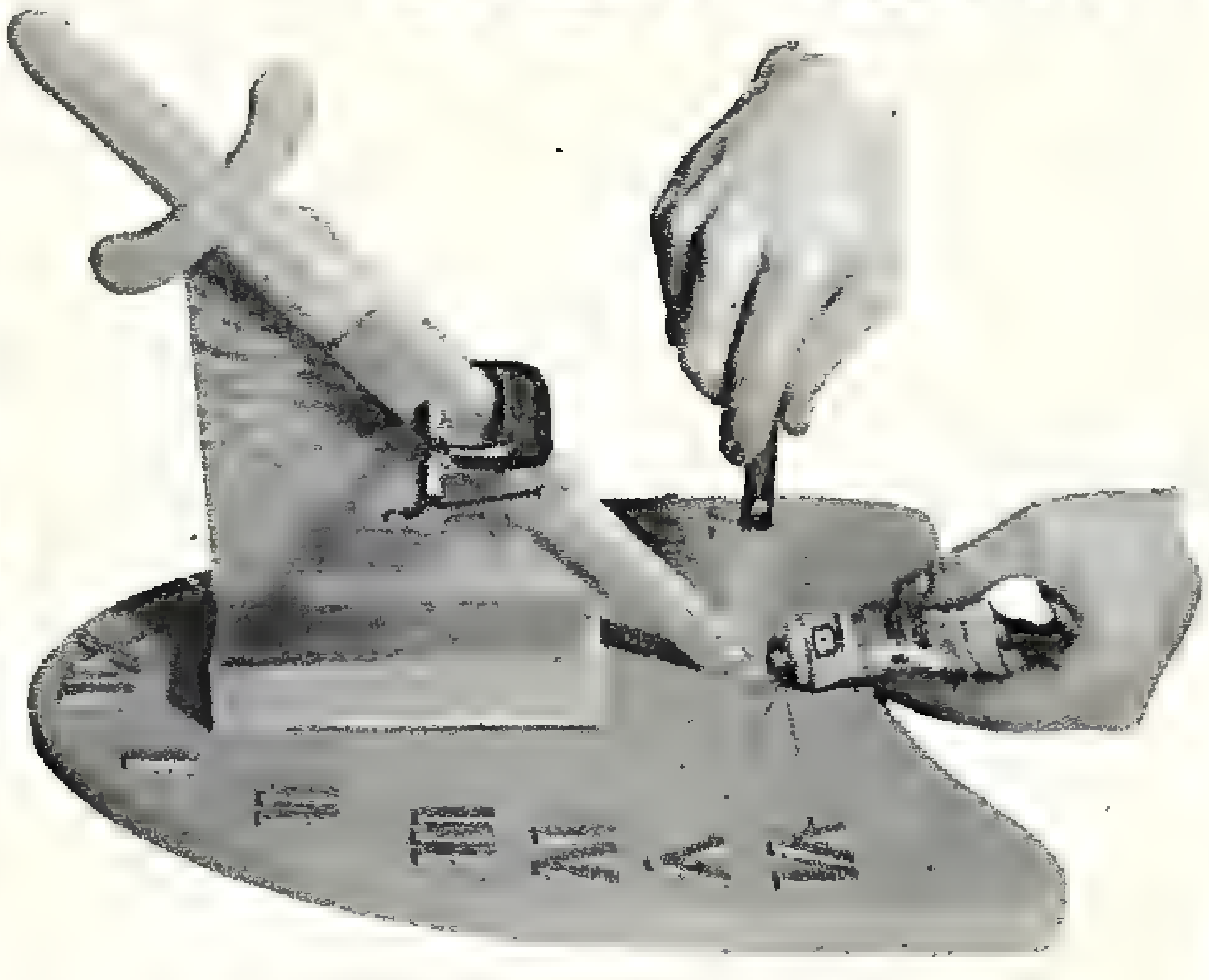
Wind the coil on a 1¼" form using No. 28 enameled wire. The coil is mounted to the side of the cigar box with screws and studs. The crystal detector being of the fixed type needs no adjustment. Since heavy wire is used to wire up the circuit the smaller parts require no mounting; the wire holds them rigid.

The simplicity of the circuit makes it almost foolproof in operation. Unlike the usual set it will not get out of order easily. Some caution should be exercised, though, in connecting the power supply so that connections are properly made.

A NOVEL SWORD and SHIELD SUNDIAL


VI
VII
VIII
IX
X
XI
XII
I
III
IV
V
VI

The unusual sundial as it appears when completed. At right is shown the manner in which the jig insures the sword being mounted at the correct angle. The sword is anchored to shield with plastic wood. Don't remove jig until plastic wood dries.



With a protractor lay out the divisions according to constructional details. Fig. 2 shows the manner in which this is accomplished. Paint the hour lines on the shield neatly with black enamel. Paint the sword aluminum, the shield bronze.

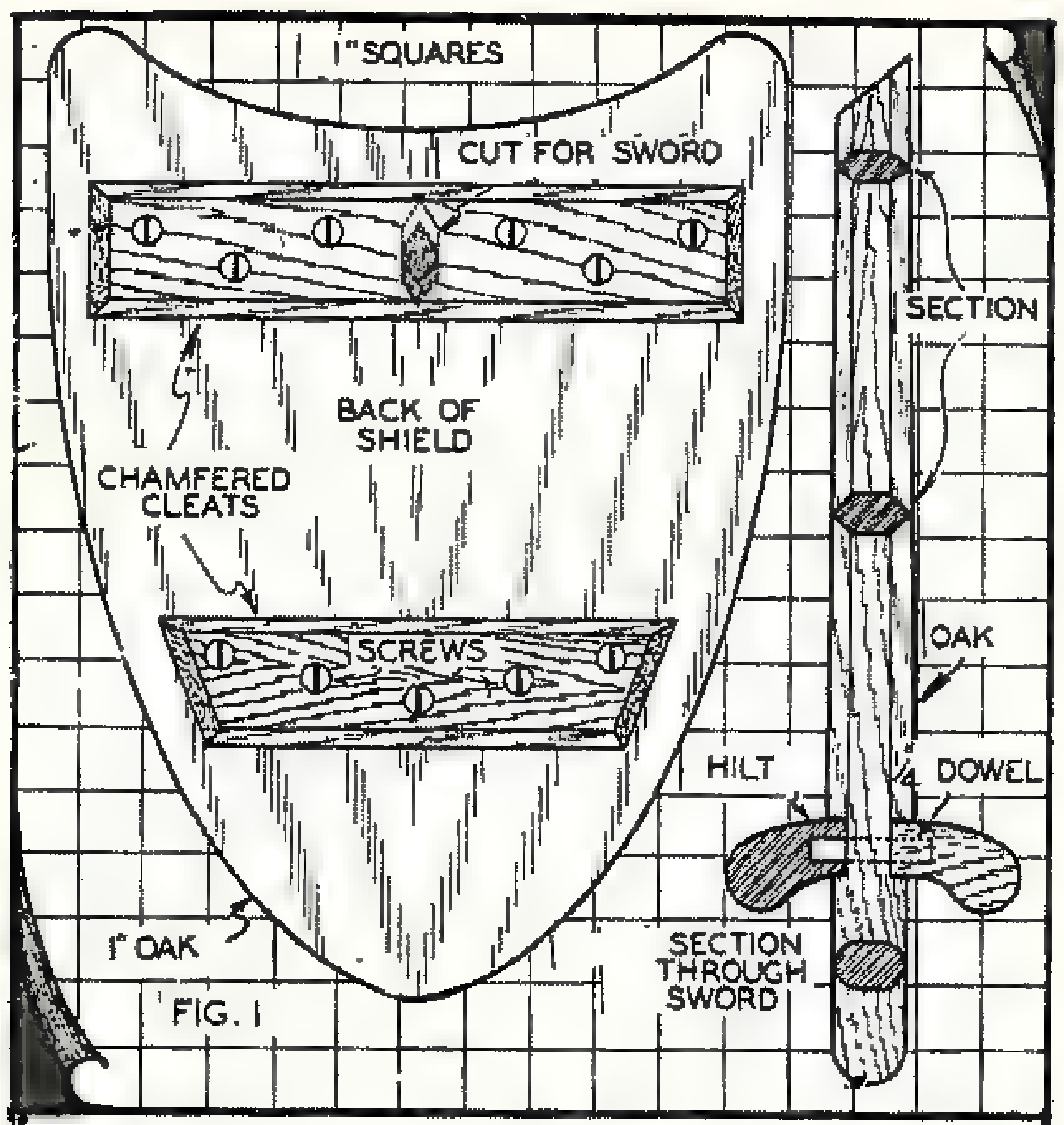

1" SQUARES
CUT FOR SWORD
SECTION
BACK OF SHIELD
CHAMFERED CLEATS
SCREWS
OAK
HILT
¼ DOWEL
1" OAK
SECTION THROUGH SWORD

FIG. 1

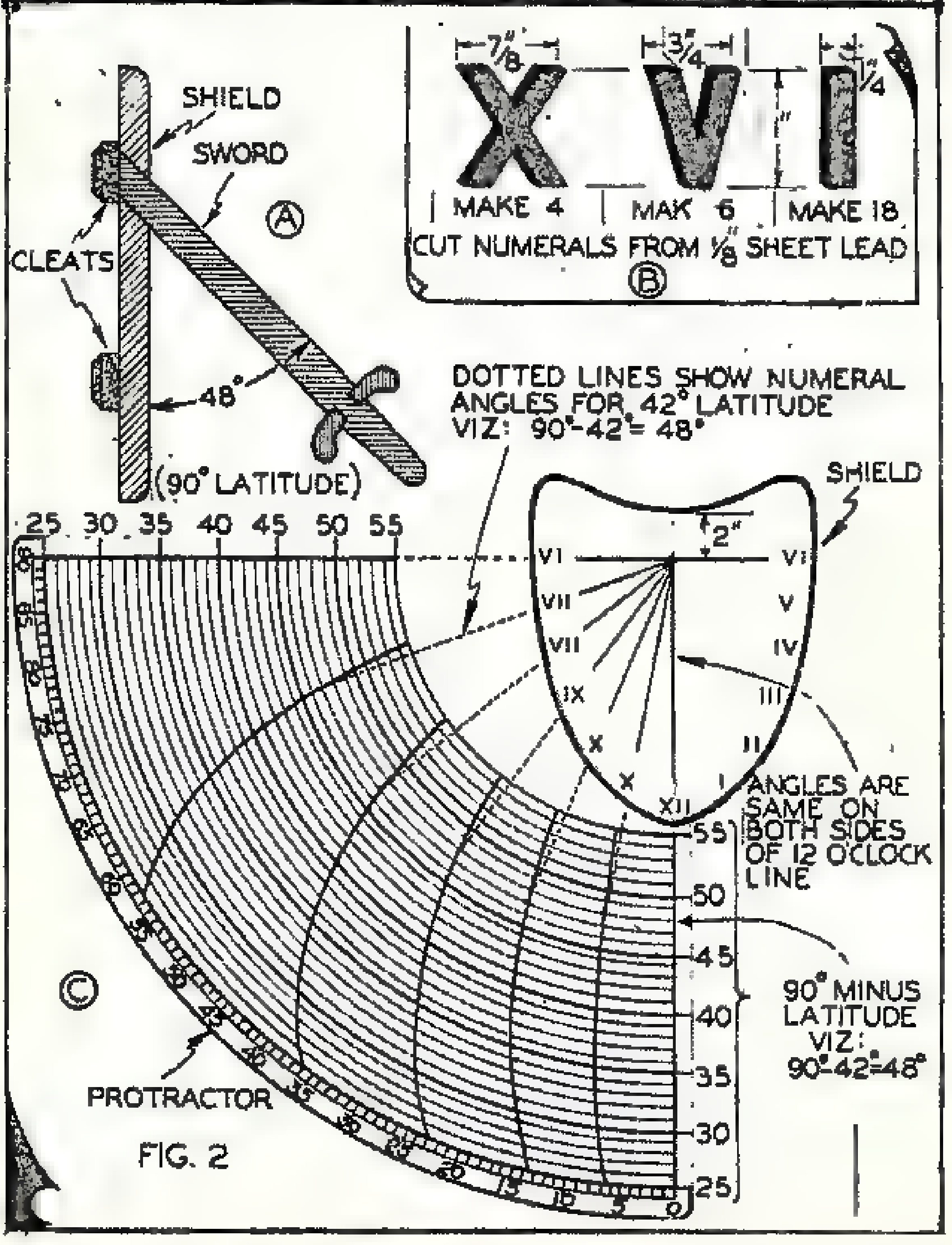

SHIELD
SWORD
Ⓐ
CLEATS
48°
(90° LATITUDE)
7/8"
3/4"
1/4"
1"
MAKE 4
MAK 6
MAKE 18
CUT NUMERALS FROM 1/8" SHEET LEAD
Ⓑ
DOTTED LINES SHOW NUMERAL ANGLES FOR 42° LATITUDE VIZ: 90°-42°= 48°
SHIELD
2"
25 30 35 40 45 50 55
VI
VII
VIII
IX
X
XI
XII
I
II
III
IV
V
VI
ANGLES ARE SAME ON BOTH SIDES OF 12 O'CLOCK LINE
55
50
45
40
35
30
25
90° MINUS LATITUDE VIZ: 90°-42°=48°
Ⓒ
PROTRACTOR

FIG. 2

Lay out the shield according to the top plans. The hour lines are laid out on the shield with a protractor in the manner shown. Cut the numerals from sheet lead.

RARE charm may be added to the garden gate, garden wall or doorway by making a sundial like the one here described which resembles a sword thrust into a shield. This sundial, of the vertical south type, is easy to construct. And when correctly laid out is actually a good time-keeper.

To construct the dial obtain a piece of 1" oak stock 15"x11½" and on this lay out the pattern for the shield shown in Fig. 1. The sword is made from a piece of oak 16"x1⅜"x⅝". Drill a ¼" hole through the width of this piece at the center and 4" from one end, then chamfer the blade on all edges as shown in the sections in Fig. 1. The section which forms the handle is rounded as shown; the blade tapers slightly and the "point" end is cut off at approximately 45 degrees. The hilt pieces are made from small oak blocks drilled at the ends to a depth of ¾" with a ¼" drill. These pieces are then shaped and rounded either with a rasp and sandpaper or by whittling. Now cut out notches in the blade which will snuggly receive the hilt pieces, insert a short length of ¼" dowel in one of these pieces, gluing with a waterproof glue then assemble.

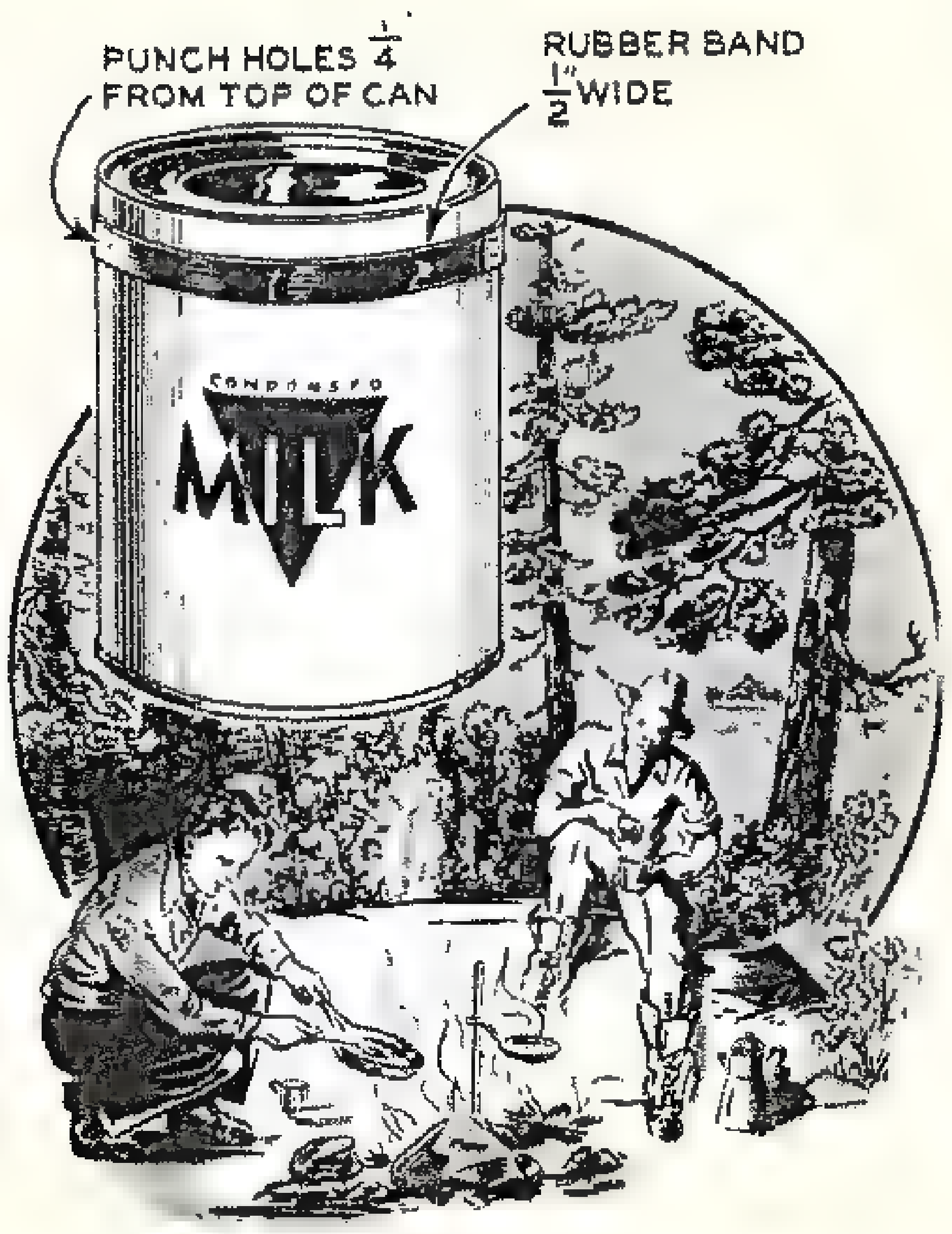
With a narrow chisel cut out a hole at the center of the shield 2" from the top edge. This hole is cut at about 45 degrees and the sword should fit into this hole. Now from 1" oak stock 2" wide cut out two cleats and chamfer the edges then screw these to the back of the shield.

On sheet lead lay out the Roman numerals. These may be cut out with tin snips or on a jig saw using a

[*Continued on page* 126]

HELPFUL TIPS FOR FISHERMEN

Rubber Bands Prevent Cans From Leaking

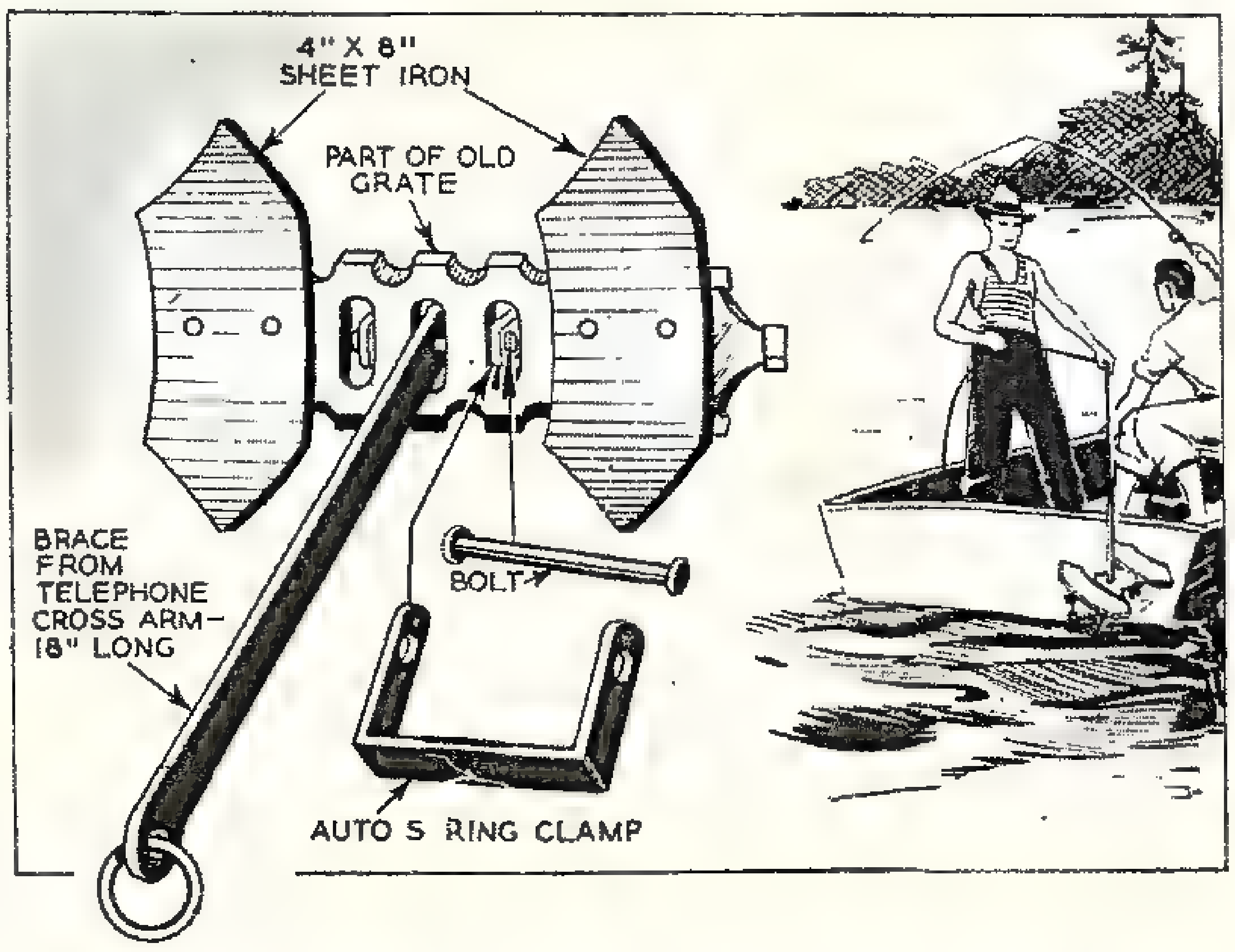

PUNCH HOLES $\frac{1}{4}$" FROM TOP OF CAN
RUBBER BAND $\frac{1}{2}$" WIDE
CONDENSED
MILK

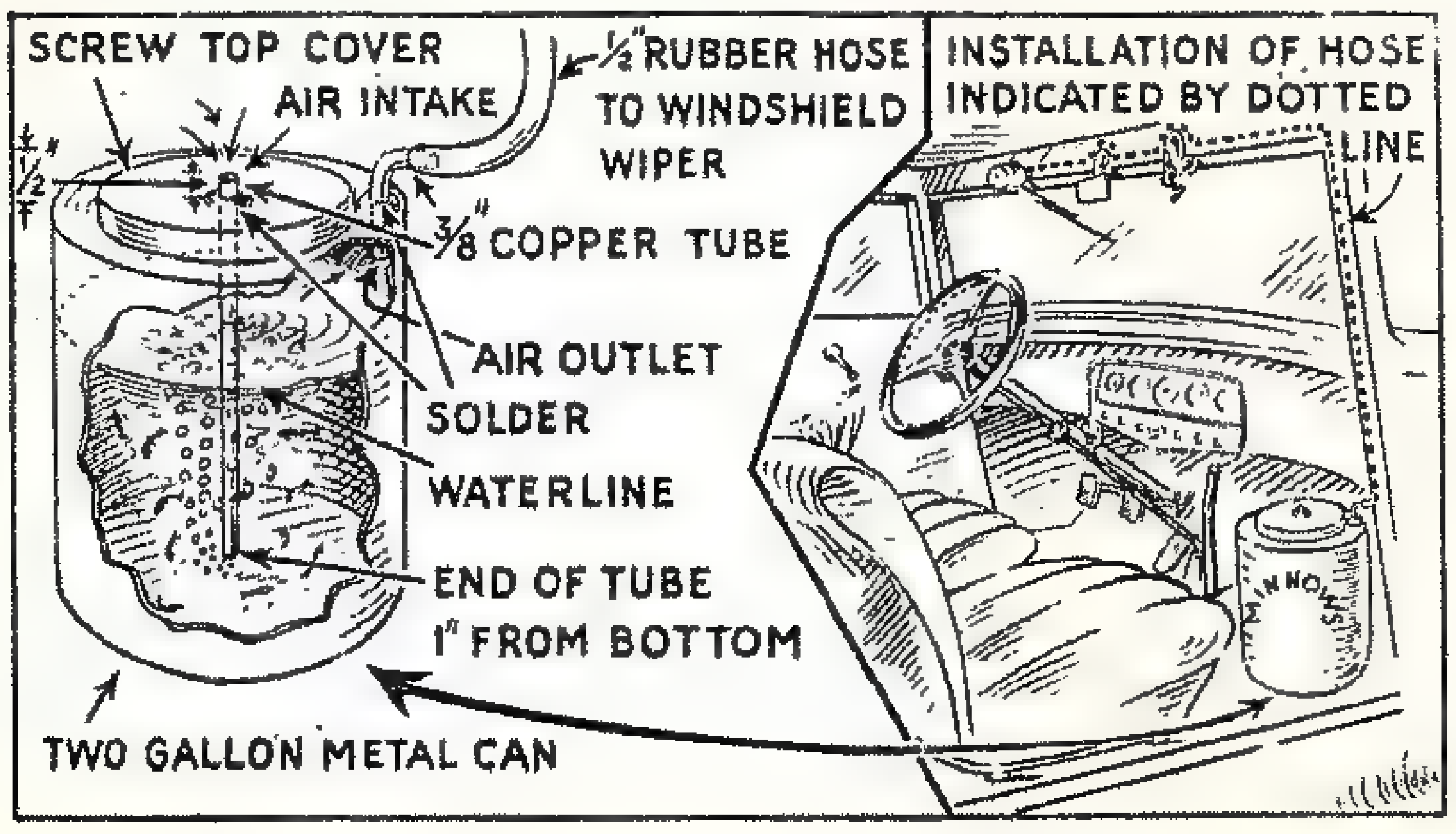
WHO hasn't at some time or other went on a camping trip only to be constantly bothered with the contents of open cans spilling and ruining all the food in the vicinity. Since this trouble was apparent especially with canned milk and since this item was one of the camping necessities it was impossible to dispense with it. Some means of sealing the can had to be found.

A length of old automobile inner tubing lying on the ground gave one of the campers an idea. Taking a pair of shears from the supply kit he cut off a band one-half inch wide, then punched a hole in each side of the can about one-quarter inch below the top. By slipping the inner tube band over the top the holes were sealed perfectly and no contents escaped.—James W. Clift.

Odd Parts Form Practical Anchor

AN OLD furnace grate, several bolts and a piece of sheet iron can be formed into a practical boat anchor which will hold even a large boat securely. To the grate attach two flukes made from pieces of 4 by 8-inch sheet iron. Stove bolts are used to hold these firmly in place. An 18-inch length of strap iron or an old telephone cross arm brace serves as the bar for the anchor.—Geo. A. James.


4" X 8" SHEET IRON
PART OF OLD GRATE
BRACE FROM TELEPHONE CROSS ARM—18" LONG
BOLT
AUTO S RING CLAMP


SCREW TOP COVER
AIR INTAKE
½" RUBBER HOSE TO WINDSHIELD WIPER
INSTALLATION OF HOSE INDICATED BY DOTTED LINE
½"
⅜" COPPER TUBE
AIR OUTLET
SOLDER
WATERLINE
END OF TUBE 1" FROM BOTTOM
TWO GALLON METAL CAN
MINNOWS

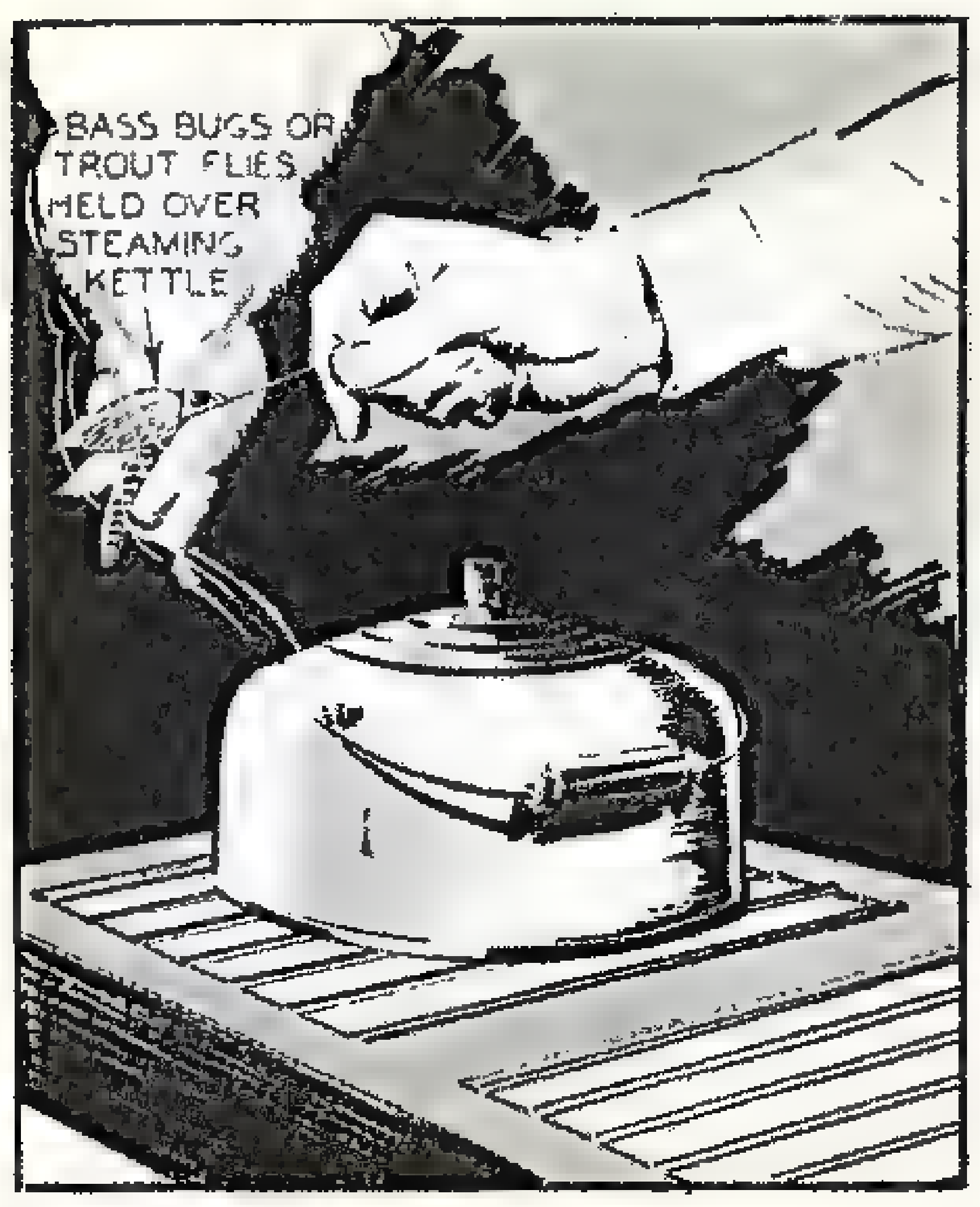
Vacuum Tank Airs Minnow Bucket

A TWO-GALLON can to which has been soldered a short length of ⅜-inch copper tubing on one side with a long piece of ½-inch tubing attached in the center makes a good minnow bucket. The windshield wiper hose is disconnected and attached to the short tube on the can.—J. Rae.

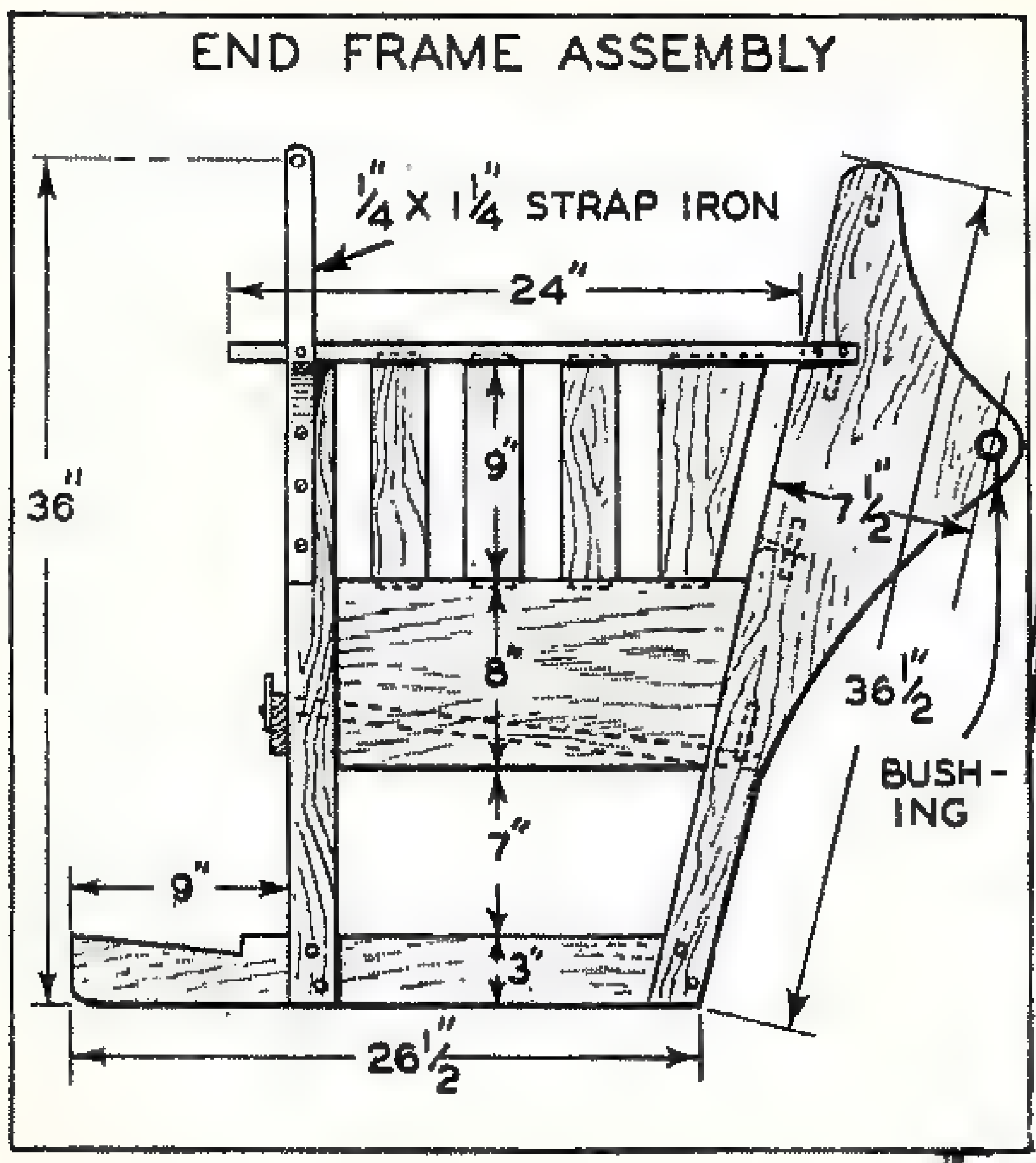
Steam Renews Feathered Fishing Lures

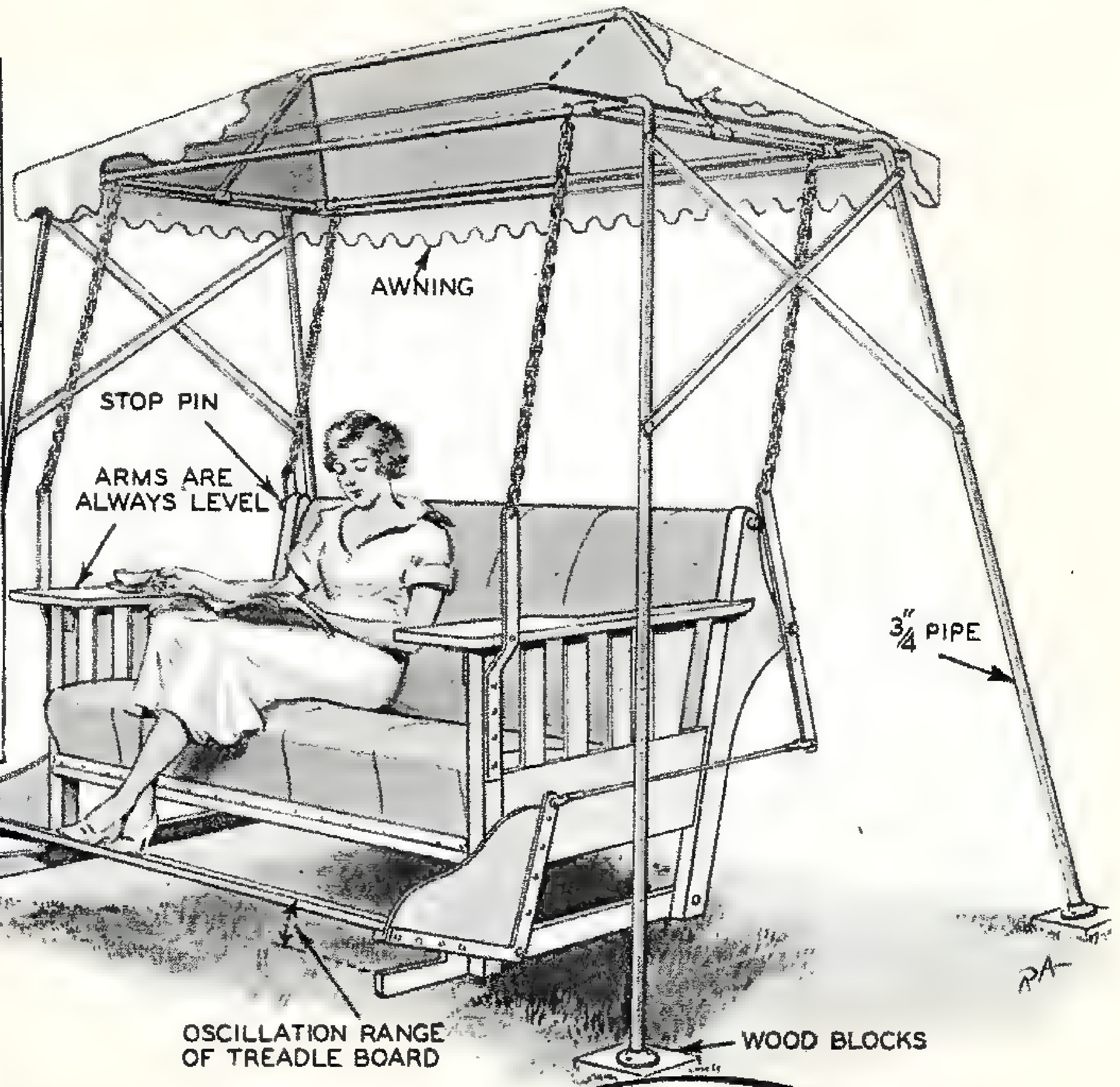
VERY often the fisherman is confronted with an assortment of fishing lures which appear too matted to be of further use. New lures are expensive and to throw the old ones away would result in many sportsmen doing without any for possibly some time.

In many cases it is possible to restore old lures to their original luster and fluffiness in a few minutes with little or no work being required to effect the change. Take the old lure and hold it over a tea kettle spout so that the live steam strikes the feathers or hair. The steam will cause the mass to open and take on fluffy appearance.—Joseph Petr.


BASS BUGS OR TROUT FLIES HELD OVER STEAMING KETTLE

A Treadle Operated Swing For The Lawn


END FRAME ASSEMBLY
1/4" x 1 1/4" STRAP IRON
24"
36"
9"
1 1/2"
8"
36 1/2"
BUSHING
7"
9"
3"
26 1/2"


AWNING
STOP PIN
ARMS ARE ALWAYS LEVEL
3/4" PIPE
OSCILLATION RANGE OF TREADLE BOARD
WOOD BLOCKS

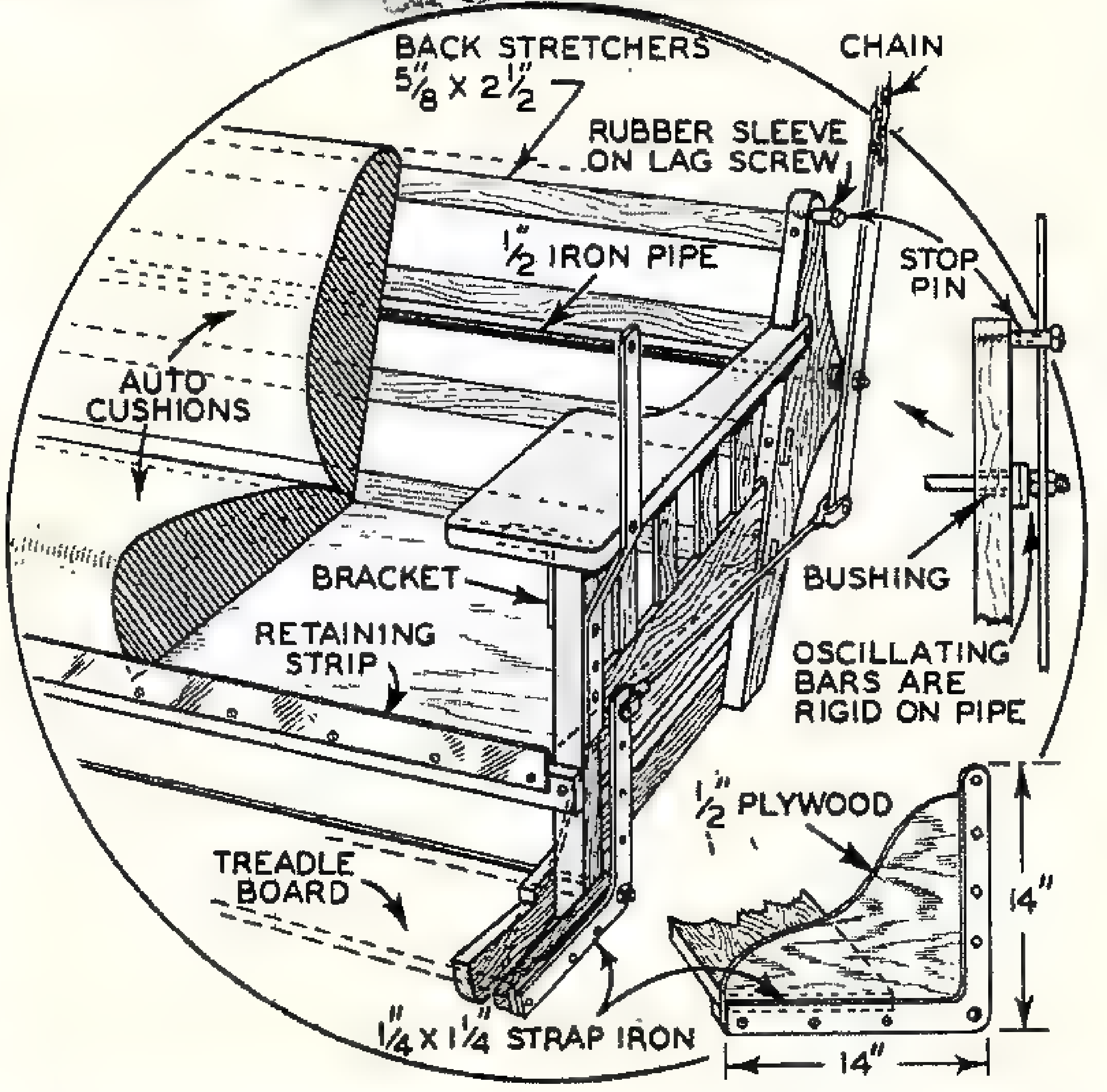
This novel lawn treadle swing may be constructed by any handy man at practically no cost. An old auto seat forms the cushion while any lumber may be used for the construction. Dimensions for the swing's end pieces are above. Old pipe forms the swing support.

THIS veranda or garden swing not only is a comfortable and ornate piece of outdoor furniture, but it offers conveniences not found elsewhere. The swing is oscillated by putting a gentle pressure to bear upon the foot-board. The operating mechanism is designed so that there are no finger-pinching or clothes-mangling joints. Because of the parallelogram suspension the table-like arms are always horizontal, permitting safe afternoon tea service in the chummy swing.

Although this is a rather imposing piece of furniture, the cost of building is trivial, and the owner of home workshop equipment will delight in the work. The rear seat cushion and back upholstery from a "quality" junked auto provide the cushions for the sedan swing. The longitudinal dimensions vary with the particular auto cushions used.

Particular attention is called to the end elevation which depicts the mechanical means of operating the swing. It will be seen that the rear suspension chains are attached to bars which are free to oscillate. These bars are linked with rods and levers to the treadle-board. A stop pin to the bars restricts the movement of the treadle-board to about 4 inches. It will be noted that when the swing goes forward the treadle-board will rise. If, at the end of the forward oscillation, the treadle-board is depressed, the rear pair of suspension chains are thrown back contributing a slight added pull to the swing.

The sedan swing may be suspended from a pipe frame-work like the one shown. The construction is shown sufficiently clearly so that the prospective builder can adapt it to his swing. A light framework of pipe serves to support an awning.


BACK STRETCHERS 5/8 x 2 1/2"
CHAIN
RUBBER SLEEVE ON LAG SCREW
1/2" IRON PIPE
STOP PIN
AUTO CUSHIONS
BRACKET
RETAINING STRIP
BUSHING
OSCILLATING BARS ARE RIGID ON PIPE
1/2" PLYWOOD
14"
TREADLE BOARD
1/4" x 1 1/4" STRAP IRON
14"

Above is shown an end view of the swing's oscillating bar assembly and the manner in which it is constructed. Pushing the treadle board lightly with feet sets swing into motion.

PAINT WISELY

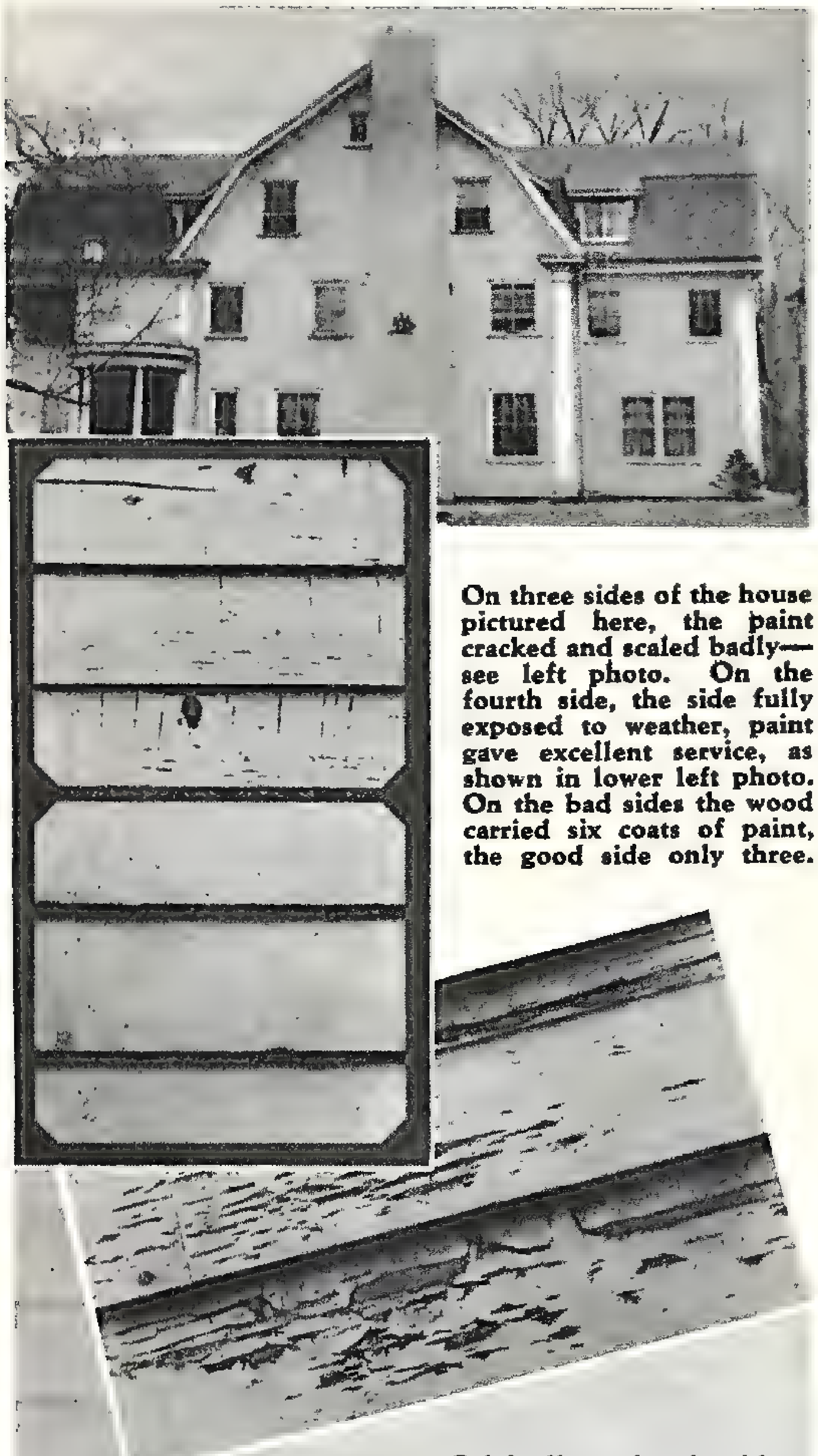
Going to paint your home? Expect trouble—blisters and such? Forewarned is forearmed, and this article may save you trouble.

HOUSE paint which cracks and peels in less than two years after application is failing unreasonably soon. If the previous coat held up well; if you bought the best quality paint and had it administered by reliable craftsmen, you are probably bewildered to know why the present coating has failed to keep its bargain with you.

The reason may be one of a number which the United States Forest Products Laboratory at Madison, Wis., has discovered responsible for failure of exterior paint jobs.

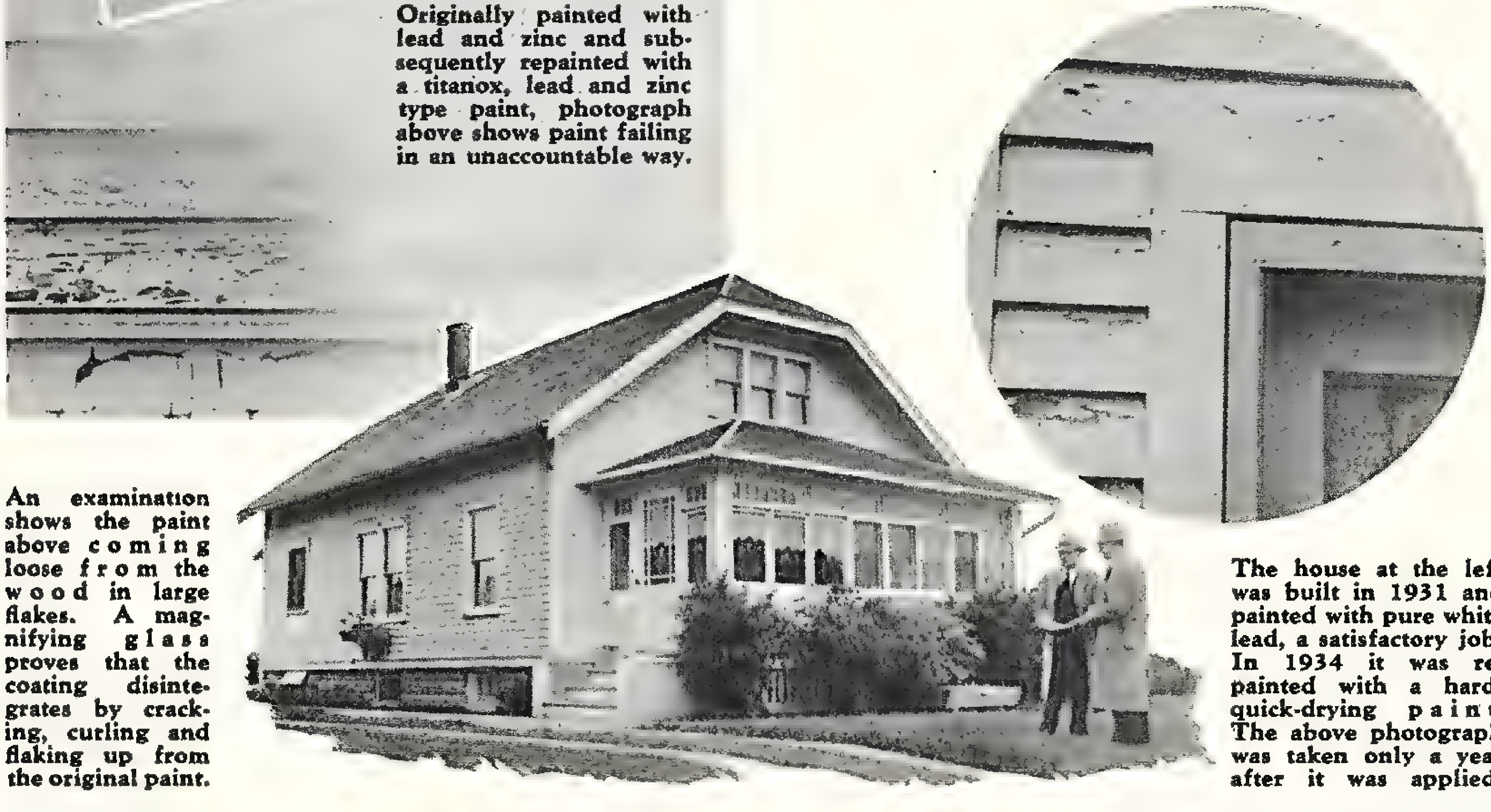
If you are one of those owners, the repainting of whose home in the next year or two is an utter necessity, let the laboratory's findings safeguard you from the exasperation, and, worse still, unnecessary costliness, which are the outcome of mistaken painting practice. With a reliable painter as consultant, you can go a long way toward diagnosing the paint ills of your own home if you compare its symptoms with typical case histories recorded by the laboratory.

It is bad policy to try to apply a white or tinted paint over brown, green, or deep red. He who does so, does it at the risk of early



On three sides of the house pictured here, the paint cracked and scaled badly—see left photo. On the fourth side, the side fully exposed to weather, paint gave excellent service, as shown in lower left photo. On the bad sides the wood carried six coats of paint, the good side only three.

Originally painted with lead and zinc and subsequently repainted with a titanox, lead and zinc type paint, photograph above shows paint failing in an unaccountable way.

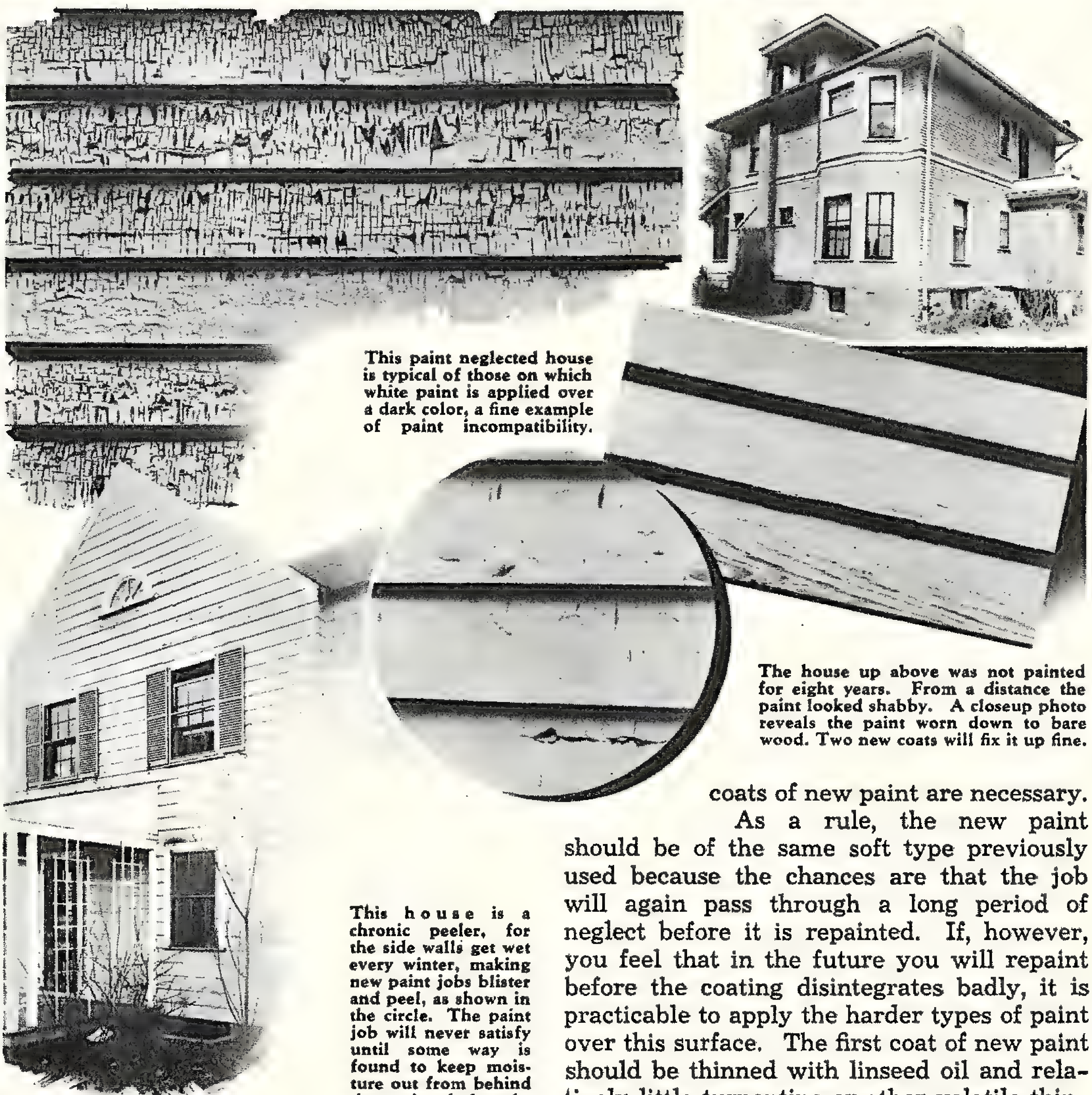


An examination shows the paint above coming loose from the wood in large flakes. A magnifying glass proves that the coating disintegrates by cracking, curling and flaking up from the original paint.

The house at the left was built in 1931 and painted with pure white lead, a satisfactory job. In 1934 it was repainted with a hard, quick-drying paint. The above photograph was taken only a year after it was applied.

and SAVE MONEY

by M. B. HOPKINS



This paint neglected house is typical of those on which white paint is applied over a dark color, a fine example of paint incompatibility.

The house up above was not painted for eight years. From a distance the paint looked shabby. A closeup photo reveals the paint worn down to bare wood. Two new coats will fix it up fine.

This house is a chronic peeler, for the side walls get wet every winter, making new paint jobs blister and peel, as shown in the circle. The paint job will never satisfy until some way is found to keep moisture out from behind the painted boards.

"disagreement" between the colors. Even between whites and tinted whites, incompatibilities may exist, especially when differences in amount and kind of pigment are marked.

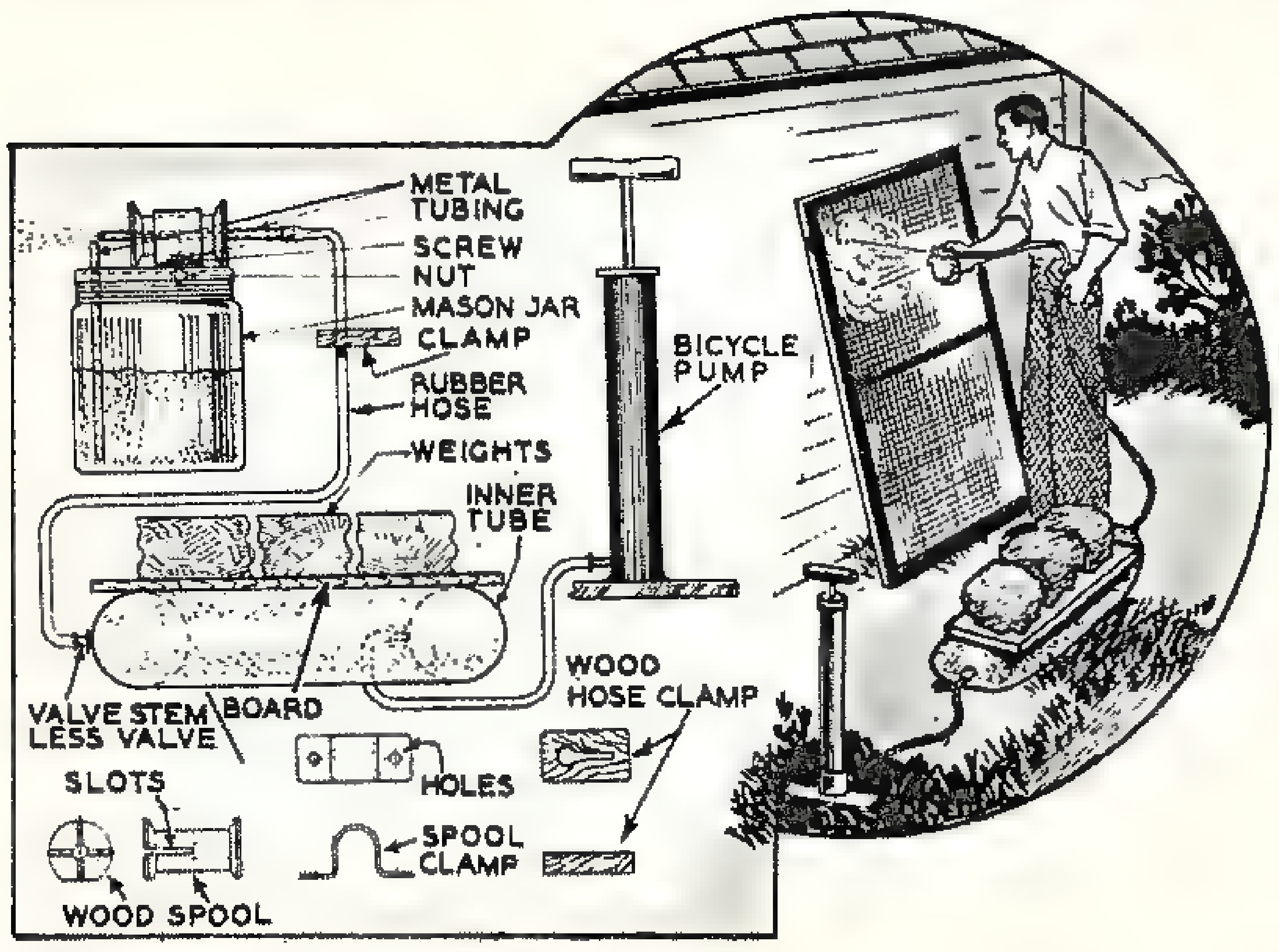
If your house has always been painted with the soft type of paint, but no new paint has been applied for seven or eight years and the coating has thoroughly disintegrated, you are in luck. Have the painter merely dust off loose chalk and dirt, perhaps cleaning a few places where soot or grease from oil-burning furnaces have collected on shaded parts of the building, and brush on new paint. Two coats of new paint are necessary.

As a rule, the new paint should be of the same soft type previously used because the chances are that the job will again pass through a long period of neglect before it is repainted. If, however, you feel that in the future you will repaint before the coating disintegrates badly, it is practicable to apply the harder types of paint over this surface. The first coat of new paint should be thinned with linseed oil and relatively little turpentine or other volatile thinner, using not more than 1¼ gallons of total liquid to 1 gallon of soft paste paint.

If your house has been painted and two or three times repainted with paints of a fairly hard type, but you have waited a little too long each time before calling in the painter, you've no doubt found successive repaintings less and less durable. If close inspection shows that the paint is disintegrating by flaking and scaling rather than by crumbling; if at the edges of the cracks the coating curls upward and eventually falls off leaving a patch of bare wood; if the coating still clinging to the wood has jagged and inse-

[*Continued on page* 130]

IDEAS FOR USE ABOUT THE HOME

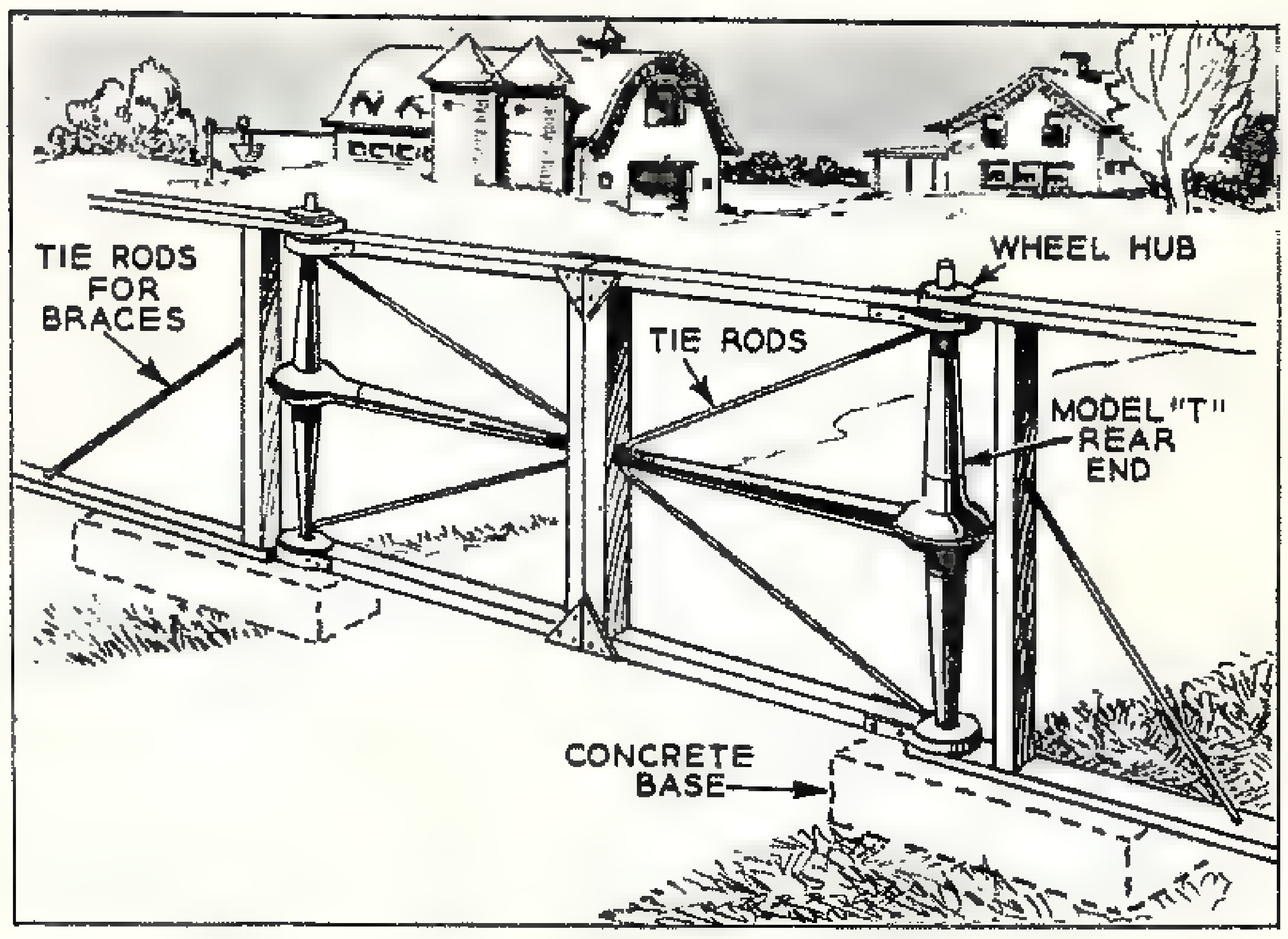

METAL TUBING
SCREW NUT
MASON JAR CLAMP
RUBBER HOSE
WEIGHTS
INNER TUBE
BICYCLE PUMP
VALVE STEM LESS VALVE
BOARD
WOOD HOSE CLAMP
SLOTS
HOLES
SPOOL CLAMP
WOOD SPOOL

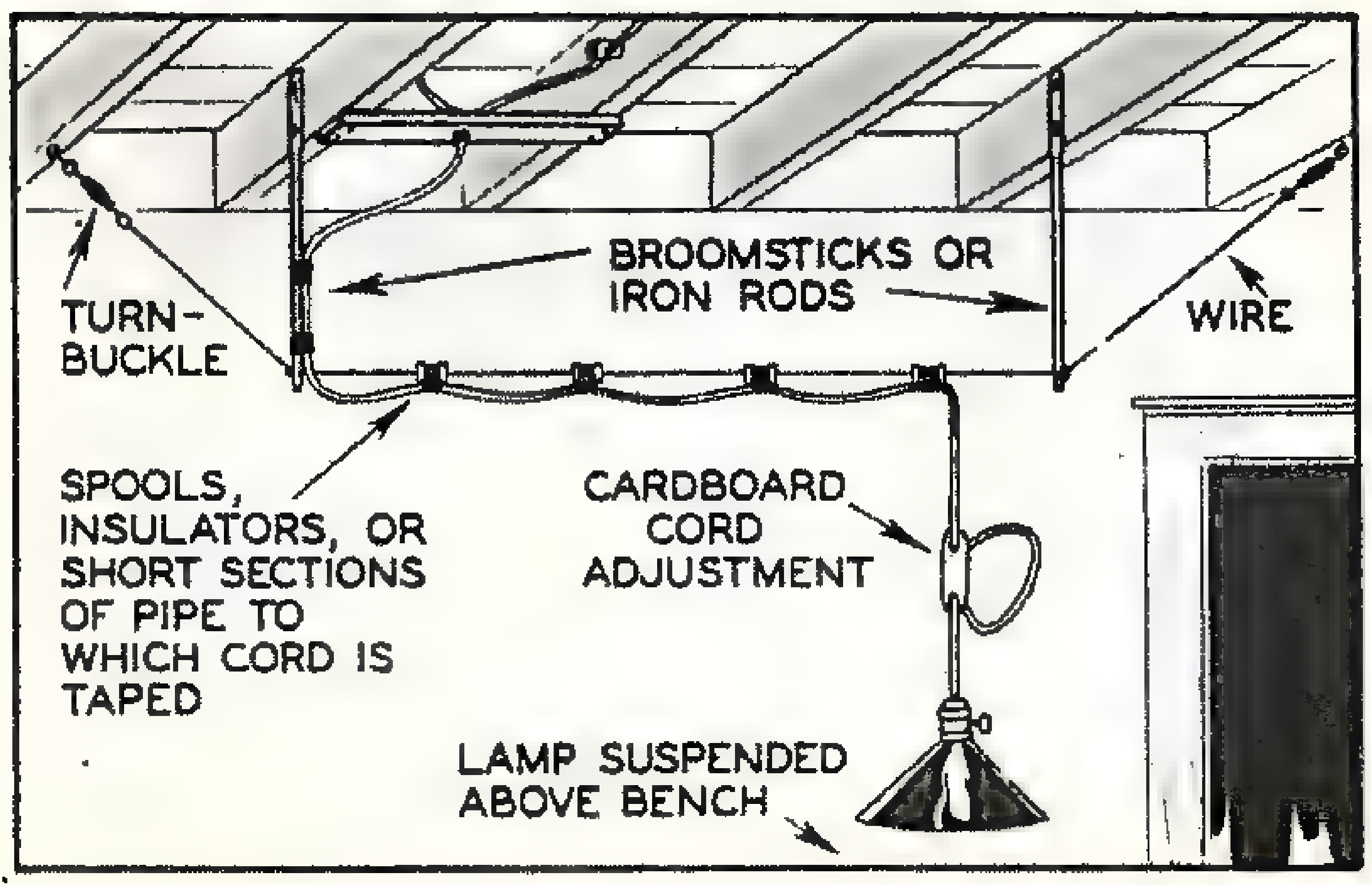
Pump Makes Handy Paint Sprayer

AN EMPTY thread spool, an auto inner tube and a small salad dressing jar are the only materials needed to build a practical paint spray for doing odd jobs about the home. Attach a copper tube to the jar lid by soldering in place. The spool serves to hold a similar copper tube rigid for the air supply. This is mounted to the jar top with a tin clamp. An old inner tube provided with an extra valve serves as an air supply for the sprayer.—L. Plebanek.

Farm Gate Built From Auto Parts

A PRACTICAL gate for farm use can be very easily built by any ambitious craftsman from a pair of Model T Ford rear ends. The gate proper is constructed from 2 by 4 or heavier stock and mounted on the wheel hubs with strap iron clamps. The tie rods act as braces for the center of the gate. The drive rods form a very rigid support for the outer sections so that the gate will withstand rough treatment. Concrete bases provide a suitable foundation on which the rear ends may be installed.—Al Cole.


TIE RODS FOR BRACES
TIE RODS
WHEEL HUB
MODEL "T" REAR END
CONCRETE BASE

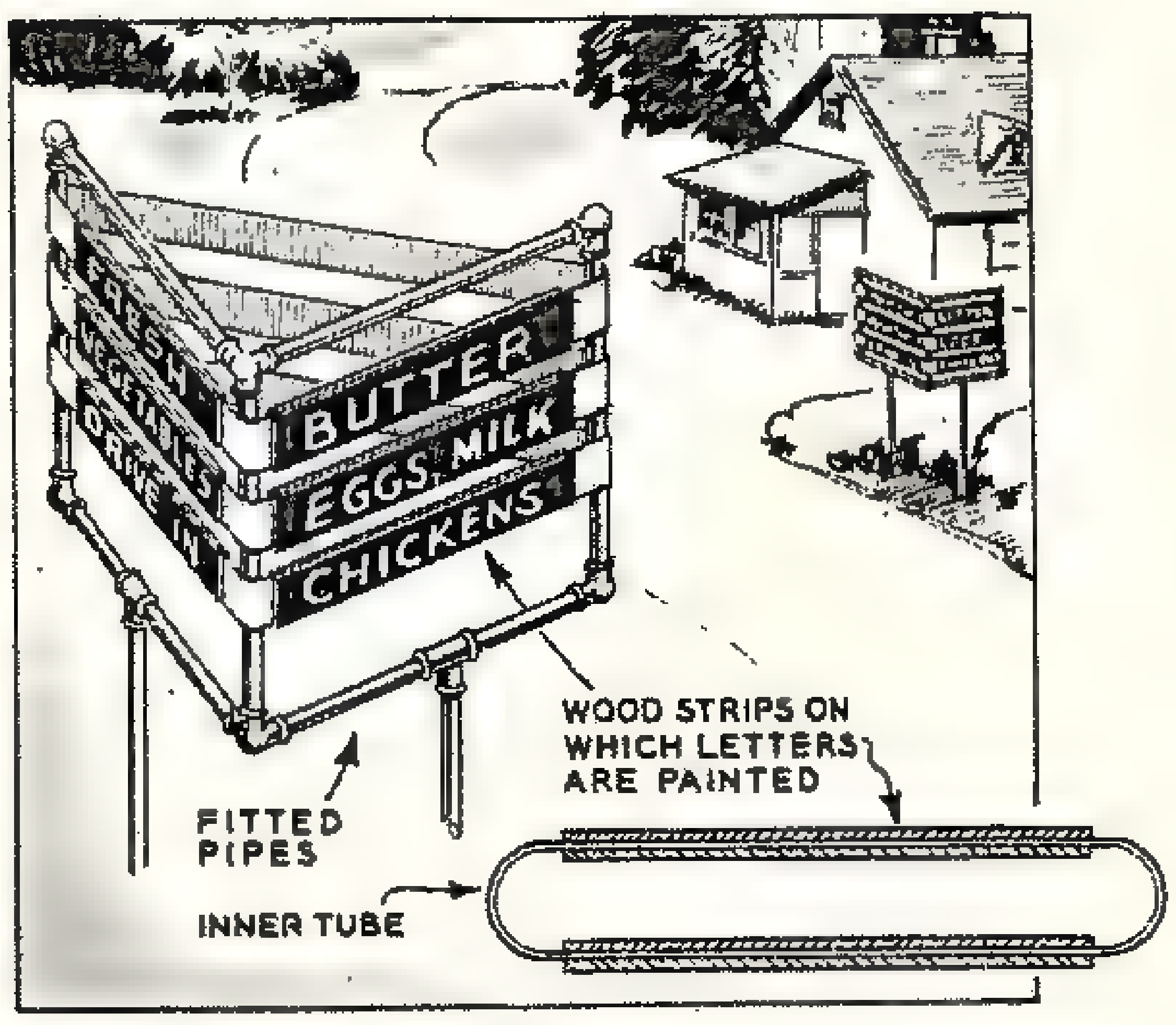

TURN-BUCKLE
BROOMSTICKS OR IRON RODS
WIRE
SPOOLS, INSULATORS, OR SHORT SECTIONS OF PIPE TO WHICH CORD IS TAPED
CARDBOARD CORD ADJUSTMENT
LAMP SUSPENDED ABOVE BENCH

Adjustable Light Slides On Cord

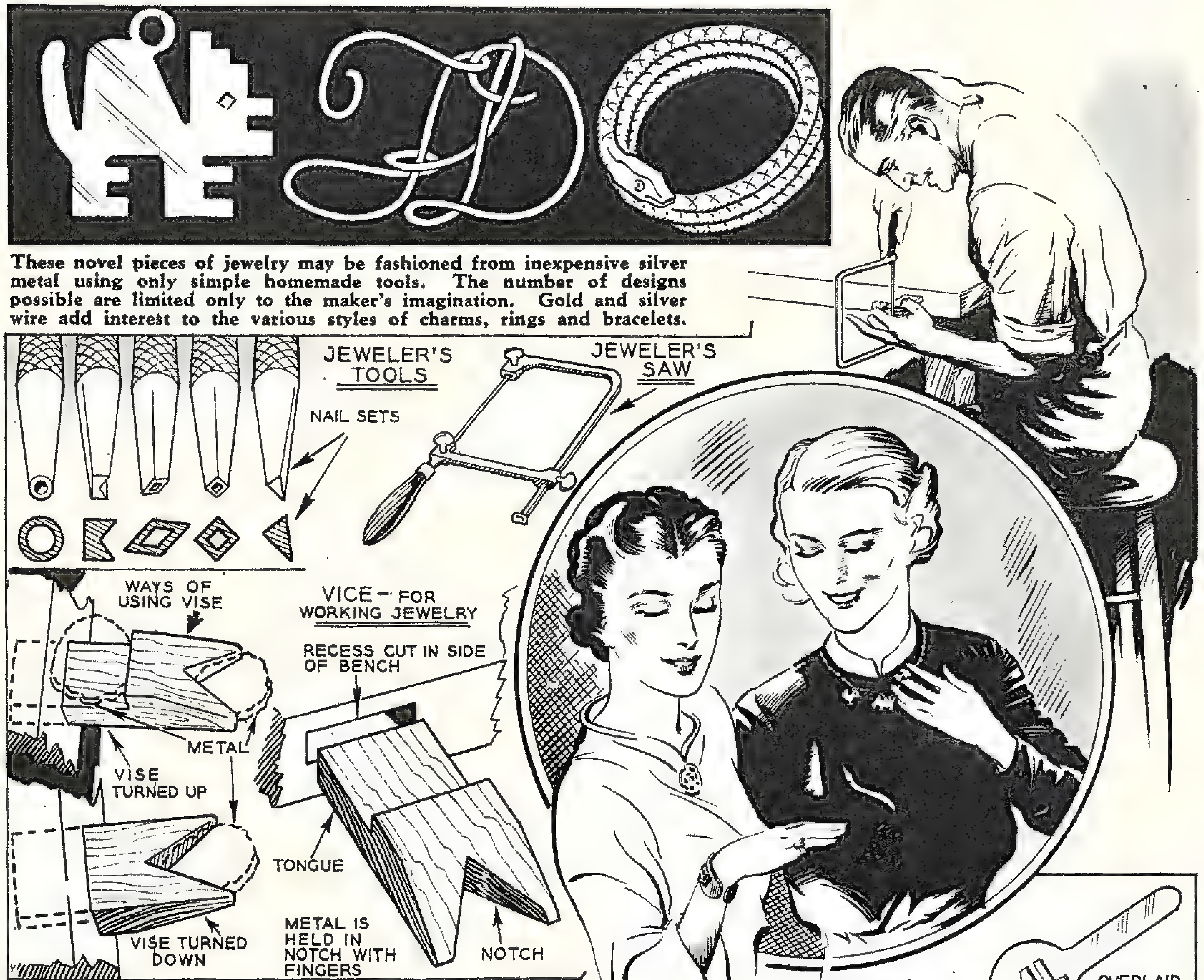
LIGHTING the workbench is one of the most trying tasks encountered by the home shopman. A sliding light is no doubt the most practical way to light the workbench. Install two rods in the ceiling and between them stretch a steel wire using turnbuckles to make it taut. Empty spools are threaded on the wire and to them the fixture cord is attached with friction tape in the manner illustrated.—W. J. Brown.

Inner Tubes Form Changeable Roadside Sign

A NOVEL and practical road sign, suitable for the farmer to advertise his produce, may be put together in a few hours using random lengths of pipe, a few fittings and old inner tubes. The pipe is made into a frame similar to the one shown after which it is painted with aluminum bronze. The inner tubes are next cut into wide belts so that they may be stretched over the frame. The signs are painted on lengths of plywood and attached to the inner tube belts with small brads. Plywood fastens to each side of the inner tube strips.—J. Ott.


BUTTER
EGGS MILK
CHICKENS
WOOD STRIPS ON WHICH LETTERS ARE PAINTED
FITTED PIPES
INNER TUBE

Making Novelty Jewelry At Home



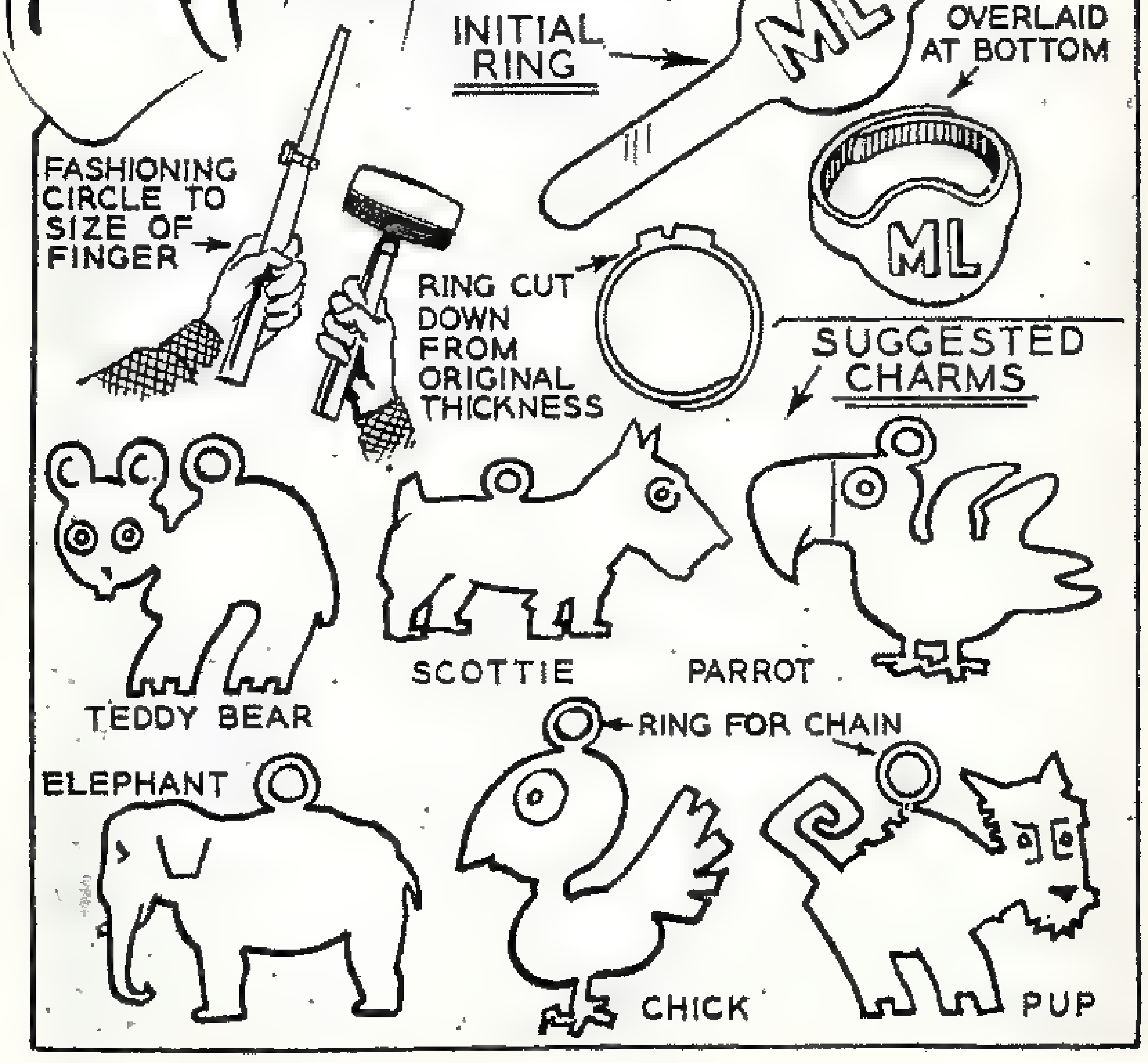
These novel pieces of jewelry may be fashioned from inexpensive silver metal using only simple homemade tools. The number of designs possible are limited only to the maker's imagination. Gold and silver wire add interest to the various styles of charms, rings and bracelets.

JEWELER'S TOOLS
JEWELER'S SAW
NAIL SETS
WAYS OF USING VISE
VICE — FOR WORKING JEWELRY
RECESS CUT IN SIDE OF BENCH
METAL
VISE TURNED UP
TONGUE
VISE TURNED DOWN
METAL IS HELD IN NOTCH WITH FINGERS
NOTCH

Here are the tools required for making the many interesting pieces of jewelry described. An inexpensive jewelers' saw, a few reshaped nail sets and a simple vice are all you need.

WITH no past experience anyone the least bit handy with tools can produce interesting pieces of jewelry ranging from rings to small charms. A jewelers' saw and a few nail sets, reshaped as shown by heating then retempering, are the only tools required. Initial rings may be cut from 20-gauge silver and fashioned to the desired size. The same metal may also be used for making small charms. A simple vice made from hard wood in the manner described will simplify working the metal especially when cutting out designs.

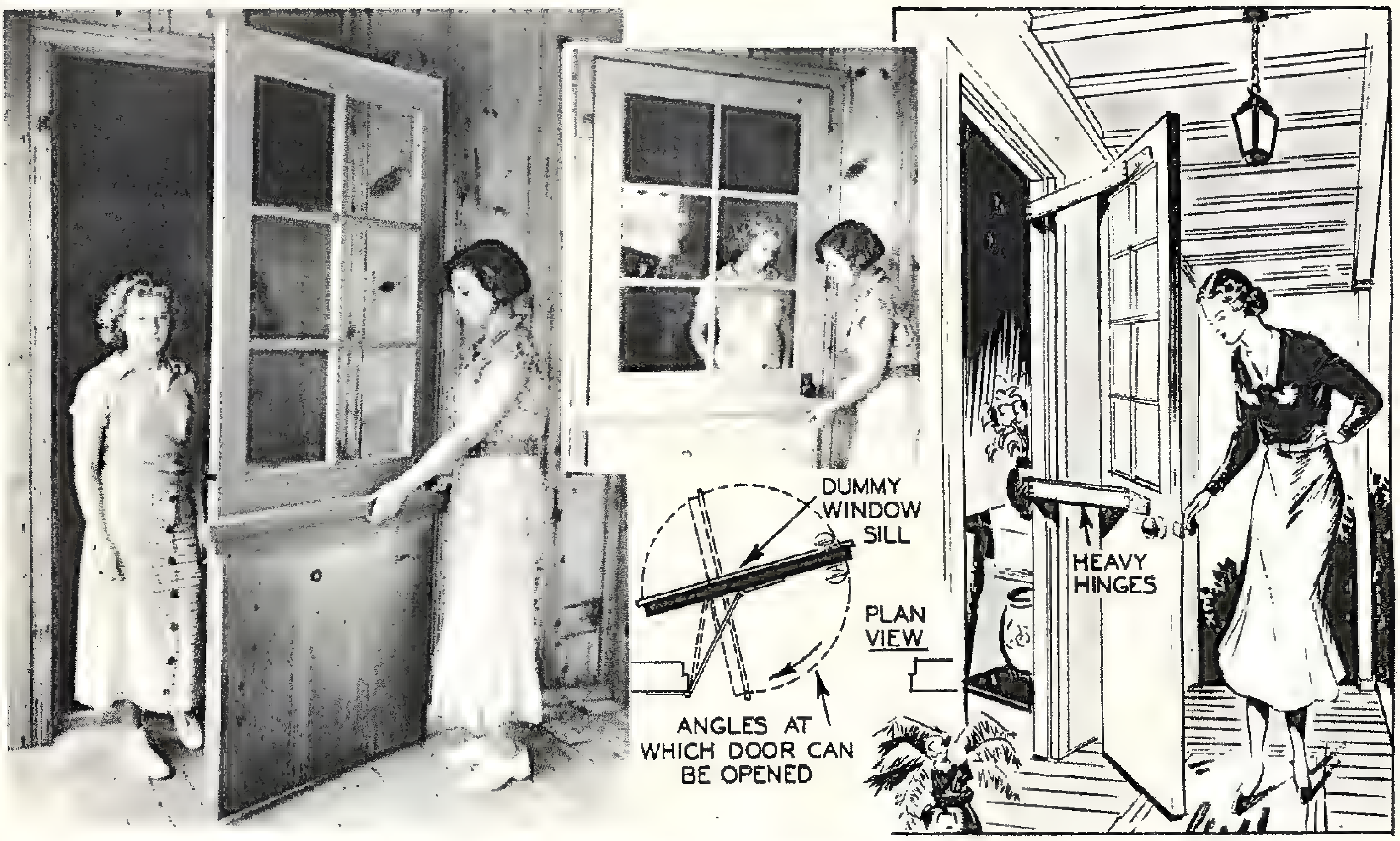
After choosing a design for a ring or pin it should be drawn full size on paper and this in turn glued to the silver sheet. The design can then be cut out accurately with the jewelers saw. After gaining skill with the more simple articles silver or gold wire may be substituted for making initialed pins and bracelets. A great number of designs may be used.



INITIAL RING
ML
OVERLAID AT BOTTOM
FASHIONING CIRCLE TO SIZE OF FINGER
RING CUT DOWN FROM ORIGINAL THICKNESS
SUGGESTED CHARMS
TEDDY BEAR
SCOTTIE
PARROT
RING FOR CHAIN
ELEPHANT
CHICK
PUP

Charms such as these are cut from 20 gauge sheet silver using only a jewelers' saw. The designs are first drawn on paper which in turn is glued to the metal. After cutting, the paper may be soaked off. Novel rings that may be adjusted to fit any finger are also cut from the same metal. Initials, club and lodge emblems and decorative designs may be inscribed on face of rings by using the nail sets to form the impressions.

Combination Door-Window Adds To Home Conveniences



In order to preserve the symmetry of the outside of the home one constructor struck on the idea of a door patterned after the windows. Special hinges were provided so as to permit the door to swing out from the wall and provide an additional exit. The above photographs and drawing show how this type of construction might be applied to other types of dwellings.

BALBOA ISLAND residents vie with each other in the simple symmetry of their California homes. Consequently, one owner's worry is easily imagined. His new home was complete and he had to add another door. He was afraid the new door would throw off one side of his tastefully designed home. Yet there had to be a door. What to do?

A carpenter was called in—a carpenter who had formerly worked on a major studio lot in Hollywood. He knew just what to do in such an emergency. "Why not," he said, "make a door that will resemble a window?" Yes, that was it, a window door.

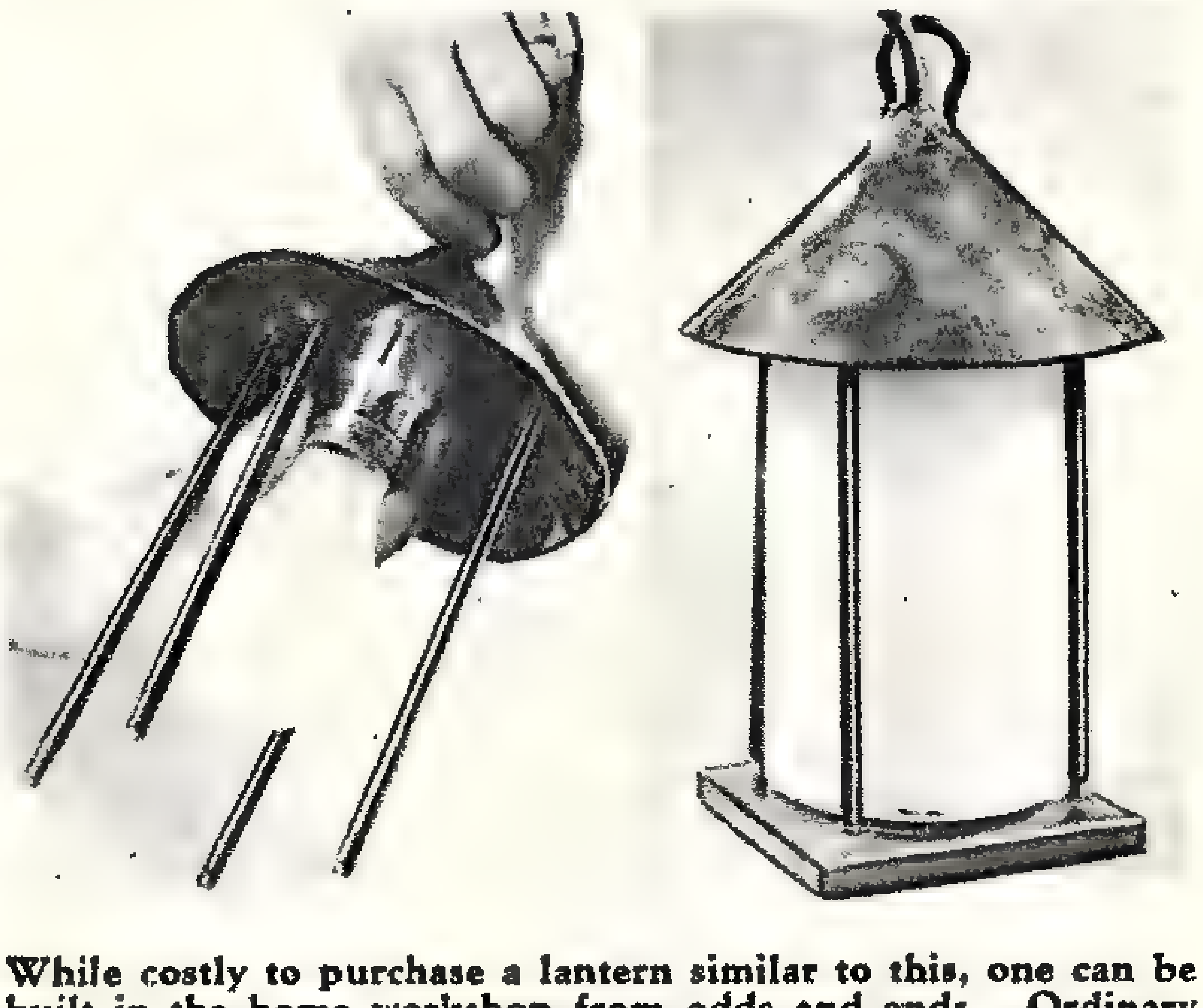
The door itself was simple to make. Just a window frame topping the lower construction, and blending with the sheathing of the house. But the hinges presented a harder problem, for the house owner wanted this disguised door to swing out and clear the wall of the house.

But again the stage carpenter had the solution. He had the blacksmith create heavy hinges of iron, and attached these to the middle of the door and to the door frame itself. The sturdy wood construction, supplemented by the heavy iron hinges prevents the door sagging or getting out of alignment even when the fogs come in from the sea.

Fruit Jar Makes Decorative Lantern

THIS attractive lantern is made with an ordinary preserve jar. Other materials required are four supporting metal rods, threaded at one end, and some sheet steel.

A piece of the sheet steel is formed into a 6-inch wide by 3-inch high cone, and the four rods are welded or soldered inside the cone. The base is made 5 inches square. Make the jar opaque, using an emory wheel.



While costly to purchase a lantern similar to this, one can be built in the home workshop from odds and ends. Ordinary fruit jar and pieces of scrap metal comprised the materials.

VACATION *Thrills*

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My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, ☐ under 16 years. Check your age group.

Ride a HARLEY-DAVIDSON

AMATEUR PHOTO PUZZLERS

Your Camera Problems Answered

In this department the Photography Editor will answer any question or problem related to cameras of all types, enlarging, printing, developing, taking pictures, and the various phases of home movie making. When sending questions to this department, be sure to include a stamped, addressed envelope in case space not permit publication of the question and reply on this page. Send all inquiries to the Photography Editor, Modern Mechanix Hobbies & Inventions, *Greenwich, Conn.*

CAUSE FOR SPOTS ON PHOTOS

I find that negatives from a recent roll of film show large, round spots in the center. Some are black, while others are thin or nearly clear. Was this trouble caused by the film or by the camera?—J. R. M.

The large spots which you mention were caused by the camera shutter being opened after the bellows had been collapsed. Where spots are light the exposure was so great that a reversed image occurred.

MAKING THE MM PHOTO ENLARGER

In building the photo enlarger described in the May, 1936, issue of MM I should like to use a special lens instead of the lens from my camera. What is the best speed and, to, do you advise the use of a diaphram?—D. N. B.

Lens rated at f: 4.5, f: 5.6 or f: 6.3 may be used to advantage with the enlarger. The smaller the f-value the shorter will be the period of exposure. The diaphram is advisable if very sharp enlargements are desired although very good work can be secured from a lens which is used wide open. It is a good rule to use a lens having a focal length similar to that used by the camera that took the picture. For miniature negatives the focal length should be about two inches and for vestpocket size or slightly larger the focal length of the lens may be three inches. In no event, though, should the lens be slower than f: 6.3.

WHY NEGATIVES ARE MOTTLED

In some photo work done recently I was surprised to find a mottled effect on my negatives. I cannot understand the cause of this and would, therefore, appreciate some explanations.—T. R. H.

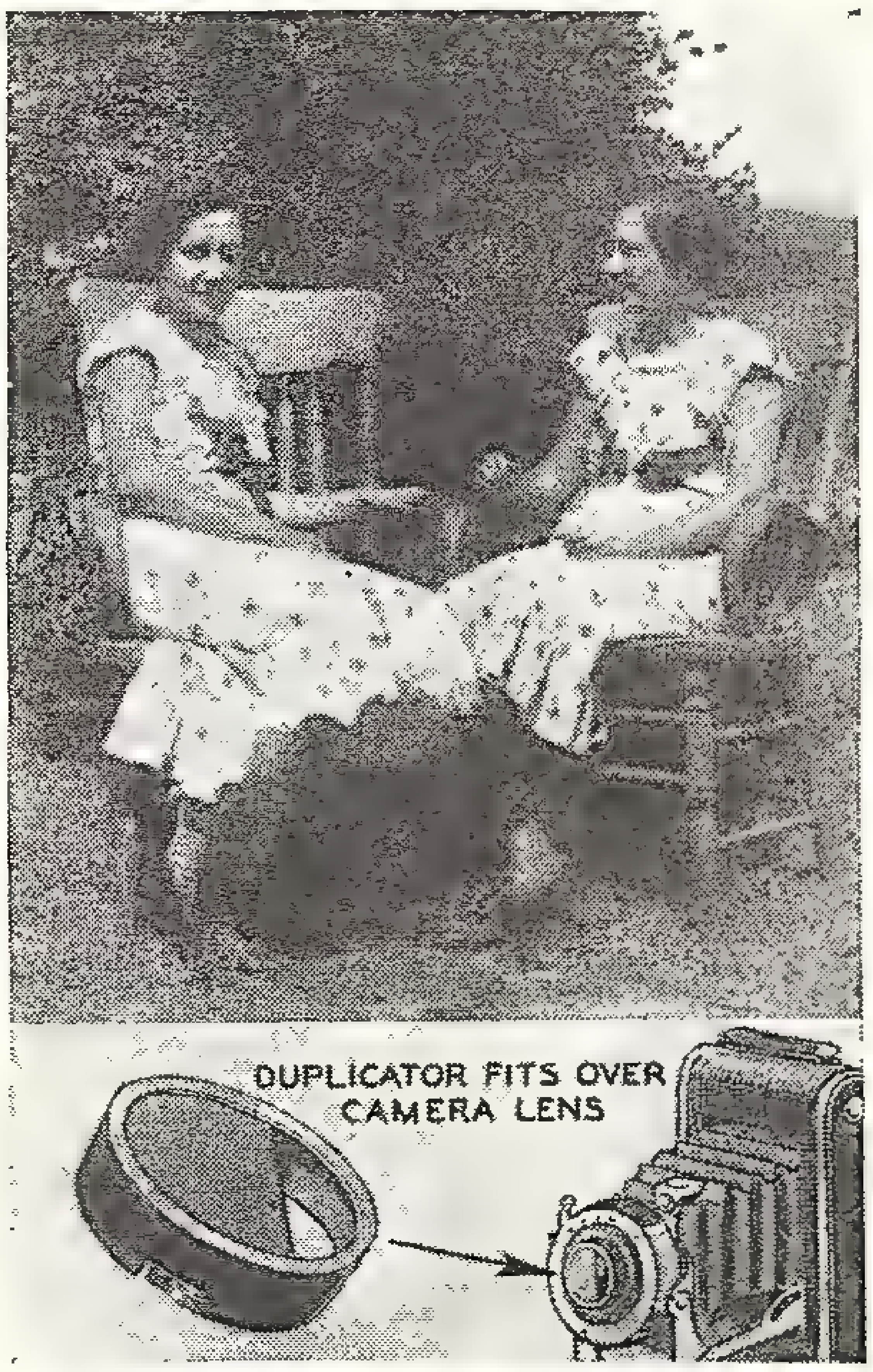
Mottled negatives may result from the paper backing of the film taking up moisture and transmitting it to the film before development. The cause of the moisture was due either to the films being stored in a damp place or used in a climate where the humidity was extremely high. The mottled effect might also be caused by insufficient agitation of the film in the developer or from the use of a developer that contained considerable sediment.

PICTURES IN RELIEF

In taking pictures of various subjects some time ago I was surprised to find that upon developing the film some of them came out in relief. When prints were made of these very unusual effects were obtained. Can you offer an explanation for this?—W. E. T.

Since the developing you refer to was done some time ago the developer was evidently of the pyro type. This developer has a tanning effect on the gelatin. The result is that the film would often swell where it was not tanned or hardened and this would produce a relief effect.

THIS PHOTO WON $5

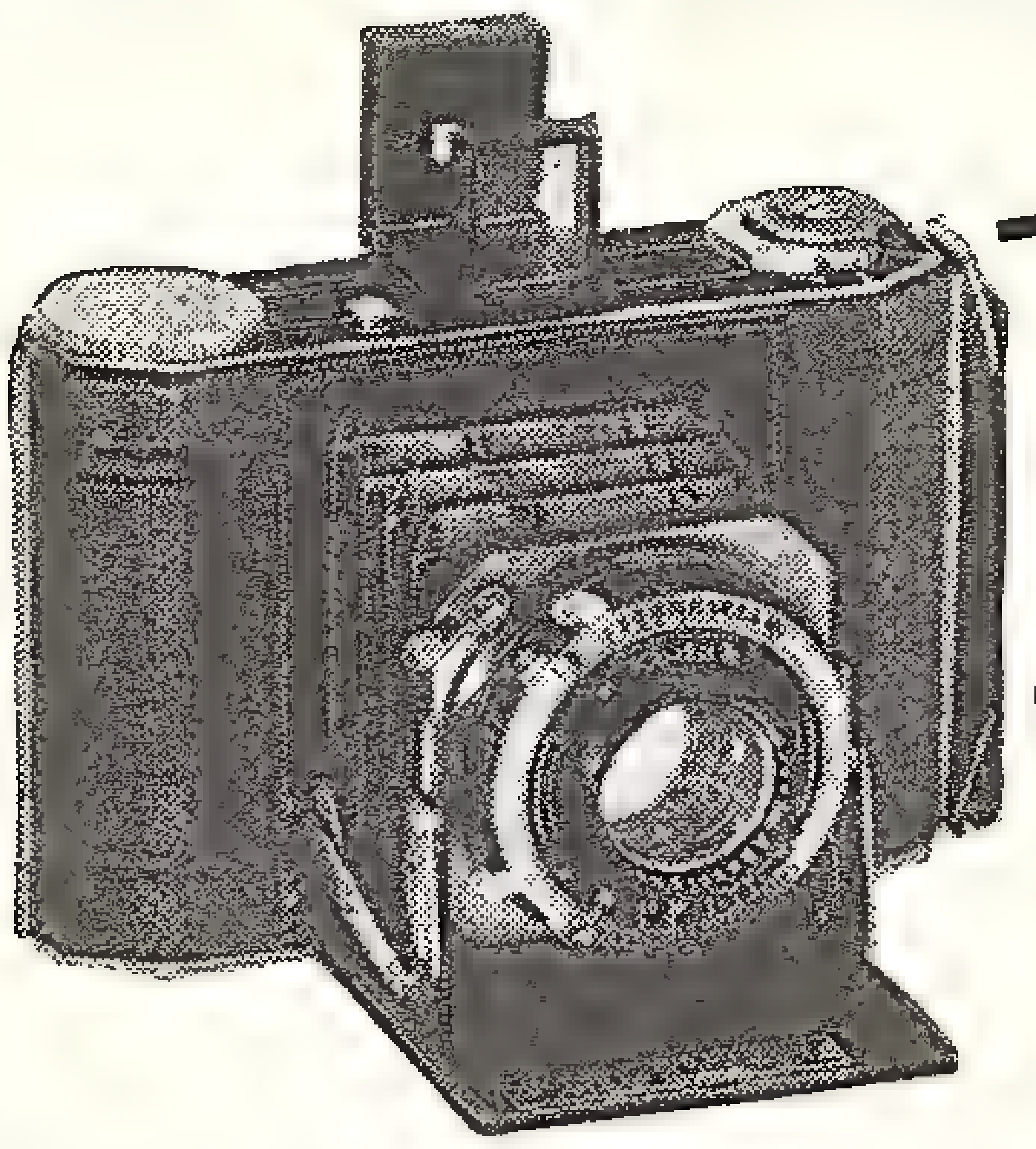

DUPLICATOR FITS OVER CAMERA LENS

These twins certainly look alike, but actually they are one and the same person. This novel picture won for Henry Sternberger of Wilmington, N. C. this month's prize of $5 for the most unusual photo. A duplicator, similar to the one shown was used on an ordinary folding camera. The camera was mounted on a tripod, then the duplicator attached over the lens and the picture snapped at one-hundredth of a second. The duplicator was then turned, to cover the other half of the lens, the girl changing her position and the camera again snapped to expose the other half of the film, this time at one-twenty-fifth of a second.

Each month MM pays $5 for unusual amateur photos or photography kinks sent in by a reader. Send all entries to MM Photography Editor, Modern Mechanix Publ. Co., Greenwich, Conn.

Snapshots this size

with this miniature camera



Kodak Duo

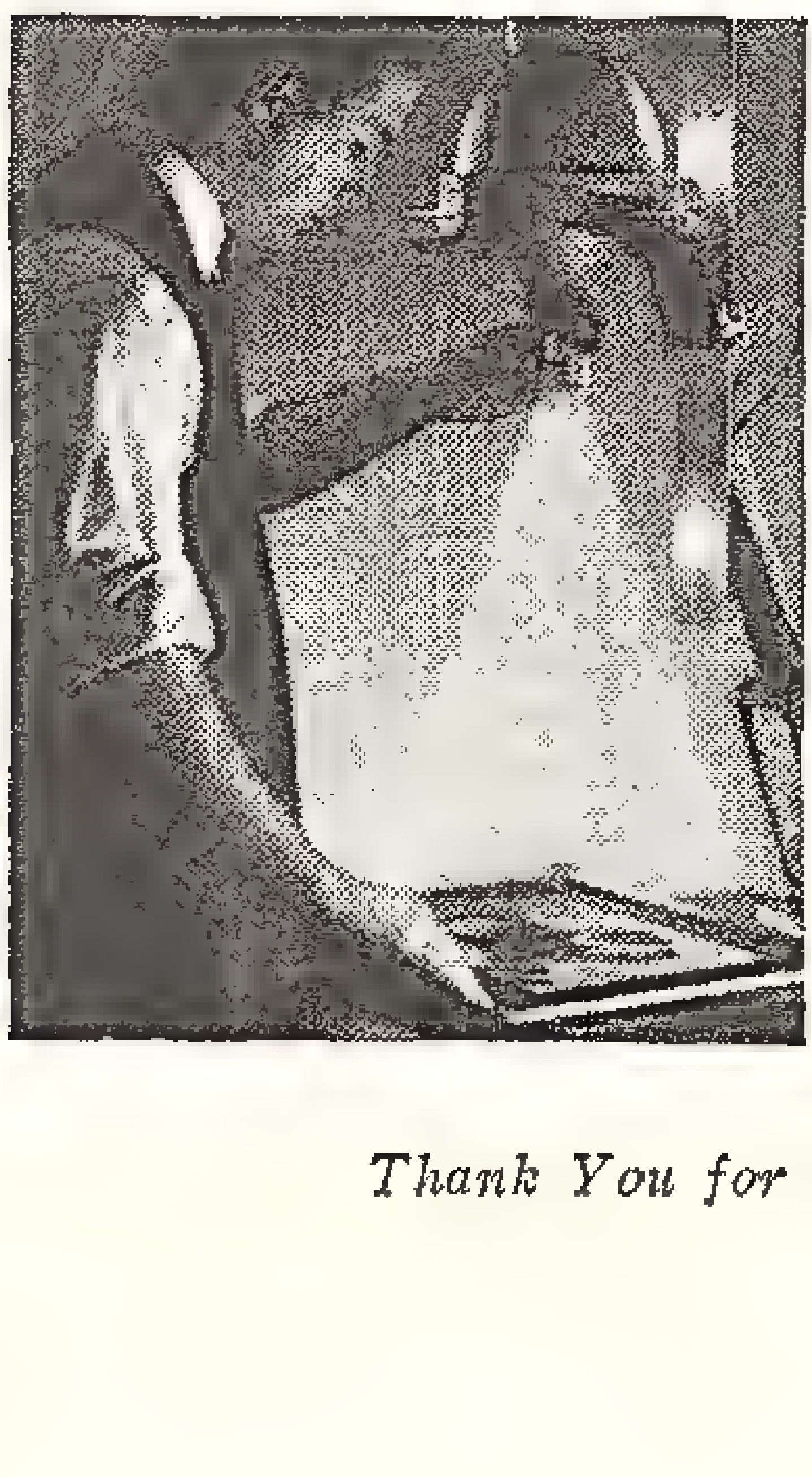
a true miniature camera yet it takes a larger picture

Kodak
8 EX.
2¼ x 3¼ IN.
KODAK FILM
PANATOMIC
F 620
Kodak

KODAK DUO is ideal for the miniature camera enthusiast. It has all the advantages of a small, pocket camera . . . economy, convenience, short focal length—yet it yields a larger picture: Makes sixteen 1⅝x2¼-inch pictures on a roll of 620 Kodak Film . . . actual size above.

There's no need for posing with Kodak Duo. The Compur-Rapid shutter, with speeds up to 1/500 second, stops action—covers any exposure requirement. The keen *f*.3.5 anastigmat lens makes snapshots in almost any light—even at night, with Kodak "SS" Film and Mazda Photoflood bulbs. Complete with depth-of-focus scale, optical finder. Price $57.50. At your dealer's.

CHOOSE THE RIGHT FILM *Kodak Verichrome Film* is an excellent all-around picture maker. Has great latitude . . . guards against exposure errors. *Kodak Panatomic* . . . extremely fine-grained, designed especially for miniature cameras. Makes striking enlargements . . . *Kodak "SS" Panchromatic* . . . extra speed for difficult pictures. Ideal for snapshots at night with Mazda Photoflood bulbs.



KODAK MINIATURE ENLARGER, MODEL B—Ideal supplement for the Duo. Makes enlargements from Duo negatives up to 16x21 inches. Paper cabinet base optional. Enlarger, Kodak Anastigmat *f*.4.5 lens, masking paper holder, iris diaphragm, magnification scale, exposure calculator, $82.50. Without diaphragm, $67.50. Paper cabinet base, $10.

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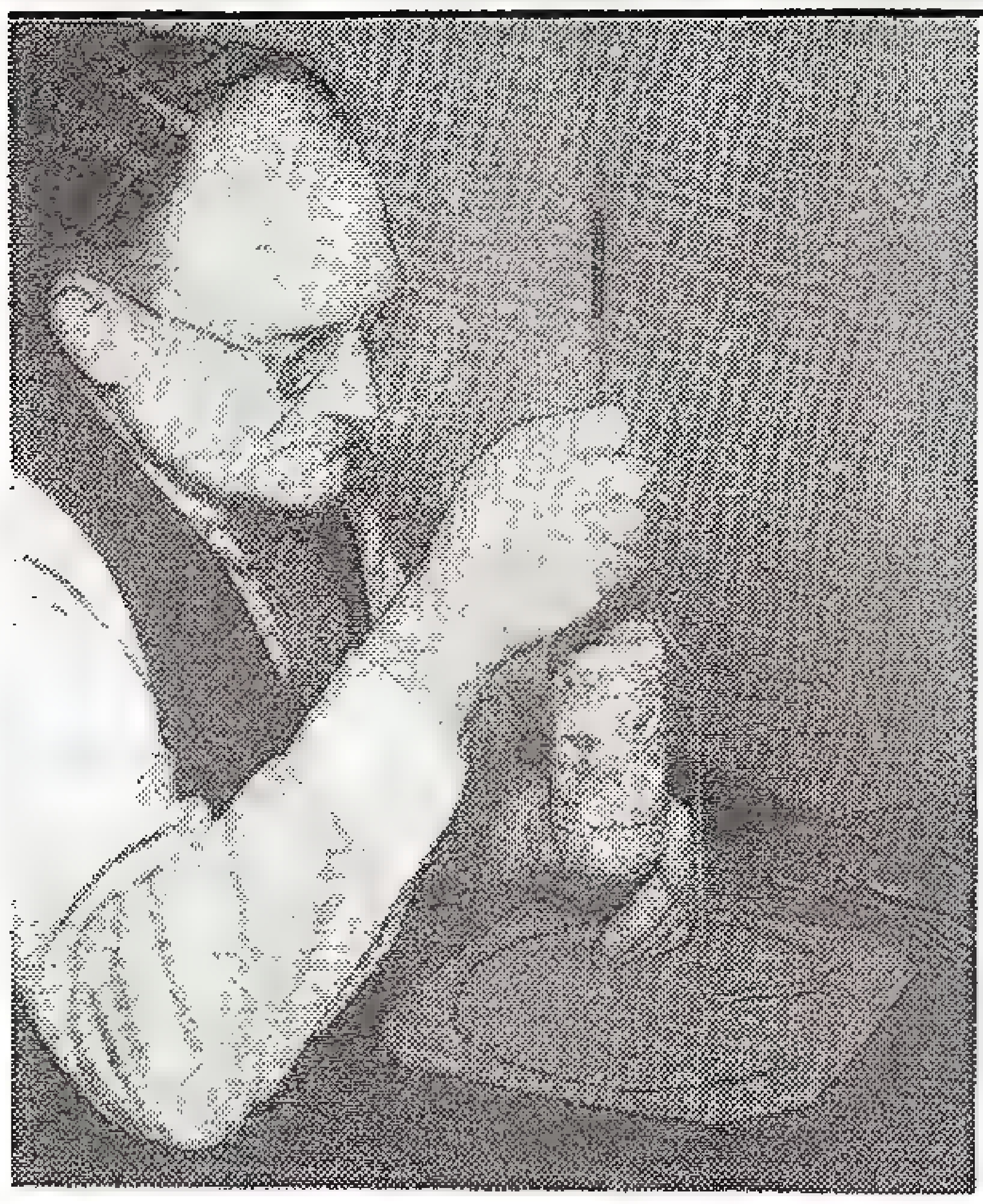
ORIGINALITY ADDS INTEREST TO HOBBIES



Master of one of the strangest hobbies in the world is J. A. Adams of Roseville, California. Using sand of various hues he places it in specimen jars to form interesting pictures of flowers, people and other objects. In some of his pictures 27 different shades of sand were required. The only tools used by Mr. Adams to form his unusual pictures are several hickory sticks and a spoon for pouring the sand into the odd shaped jars.

Desiring a collection of all the birds, fish and animals in his state Anthony Debevic, Waukeegan, Illinois youth, took up the study of taxidermy during his spare time. Using a set of books secured from a correspondence school he began with small birds and fish gradually adding other animals to his collection until now he has a wide variety of the more common species, all attractively mounted on rustic plaques.

ADLETS FOR HOBBYISTS

(See regular classified section for rates and other information.)

STAMPS

TWO Fine Airmail Triangles—Iceland triangle and new Bi-colored Mozambique triangle, and fine packet including Ubangi, Chad, Gabon, Inini, St. Pierre, Togo, Senegal, savages, ships, and animal stamps. Only 5c to approval applicants, Potomac Stamp Co., Dept. 907, Washington, D. C.

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TRIANGLES –New Bi-Colored Mozambique airmail triangle; Bolivia and Guatamala triangles, smallest in the world; and the attractive Costa Rica triangle. All four "hard-to-get" triangles for only 5c to approval applicants. Arlington Stamp Co., Dept. 907, Bethesda, Md.

BRITISH TURKISLANDS—Also Congo's—Montecarlo—Nigercoast—Uganda—Djibouti –Ecuadorian—Ivorycoast—Ubangi—Countries collectors need. Free for 5c postage. EMPIRE STAMP SHOP, Dept. MM., TORONTO, CANADA.

AMAZING Caucasian Collection of 24 stamps from Azerbaijan, Transcaucasian Federated Republic, Georgia and Armenia—cataloguing $2.00—only 10c to approval applicants Viking Stamp Co., Williamsburgh Bank Building, Brooklyn, N. Y.

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SCARCE SIBERIA, Two Russian Levant. Far Eastern Republic cataloguing $.35; interesting Soviet Packet—Everything 5c to approval applicants! Saxon Stamp Co., Albee Bldg., Brooklyn, N. Y.

115 WORLDWIDE STAMPS; Asia. British Colonials, Europe, Africa, etc., 3c to approval applicants. Extra-Pictorial Set FREE! Hunziker, Box 225-E, Minneapolis, Minnesota.

STAMPS! 100 diff. 3c; 500 diff. 35c; 1.000 diff. 90c! Illustrated Album (4000 spaces) 22c. Approvals sent. Tatham Stamp Co. (D9) Springfield, Mass.

25 UNITED STATES Stamps Free to new approval applicants sending 3c postage. Brownie Stamp Shop, Dept. M, Flint, Mich.

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STAMPS sent on approval. Quality at low prices. Fred Herzberg, MM 197, Grantley, Elmhurst, Ill.

130 STAMPS; duplicate book 10c. Approvals. Robert Erickson, 3832 Burke, Seattle, Wash.

ALBUM; 215 Stamps; 1000 Hinges; Tweezers; Stockbook. All 60c. Burtis Co., Saratoga, N. Y.

COINS

UP TO $2,000.00 for 1799 Large Cent, 1793—$750.00, Other dates to $50.00 each, 1796 Half Cent $250.00, Others to $30.00 each, Flying Eagle Cents to $20.00, 1860 Cent to $50.00. Cents of 1861, 1869, 1870, 1881, 1890 to $20.00 each, 1859, 1866 to 1875, 1909 to $10.00 each, Lincoln Cents to $35.00 per 100, etc. We guarantee to pay the World's Highest Price. Send dime for this complete large illustrated list before sending coins. Romanocoinshop, Dept. 560, Springfield, Mass. (In Business Since 1927).

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16 ARROWHEADS, Scalpingknife, Gempoint, Spearhead $.99—110.000 Bargains; Relics, Firearms, Antlers. Photolist 10c. Paul Heikes, Rutland, Illinois.

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12,360 *Sparks per Minute*

This gage makes sure that the distributor bearing is at right angles with the face of the advance housing flange.

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WHISK along the highway in a Ford V-8 at a mile a minute and the engine is taxed but little. But when the speedometer is saying sixty, a small but vital mechanism under the hood is providing 12,360 sparks a minute to ignite the fuel mixture. The distributor must furnish hot, fat sparks at precisely the correct intervals for efficient performance and economy.

Compare these 12,360 sparks to the 1440 photographs which pass through a modern motion-picture projector in the same time—or to the 3600 ticks of the second-hand on your watch. Then you will have an idea of the important job done by the distributor on a Ford V-8.

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Name..............................

Address..............................

Build "Handy Henry" Tractor

[*Continued from page* 101]

Then measure 8 inches each way from the center, or in other words cut a 16-inch piece out of the middle of the axle. A hack saw will do the job. The axle is then welded together.

Another way that will save the cost of welding is to butt the axle together and bolt an iron on each side, like cleats, running the bolts through the iron and axle. This method is plenty strong as there is no weight directly in the center of axle.

The front tie rod is next. Unscrew the adjustable end and cut 15½ inches from this with a hack saw—rethread the rod and screw the adjustable fitting back on and align the wheels. The small steering rod has 7 inches cut from it and it had best be welded. Lay it aside as there will be a few other things to weld later on.

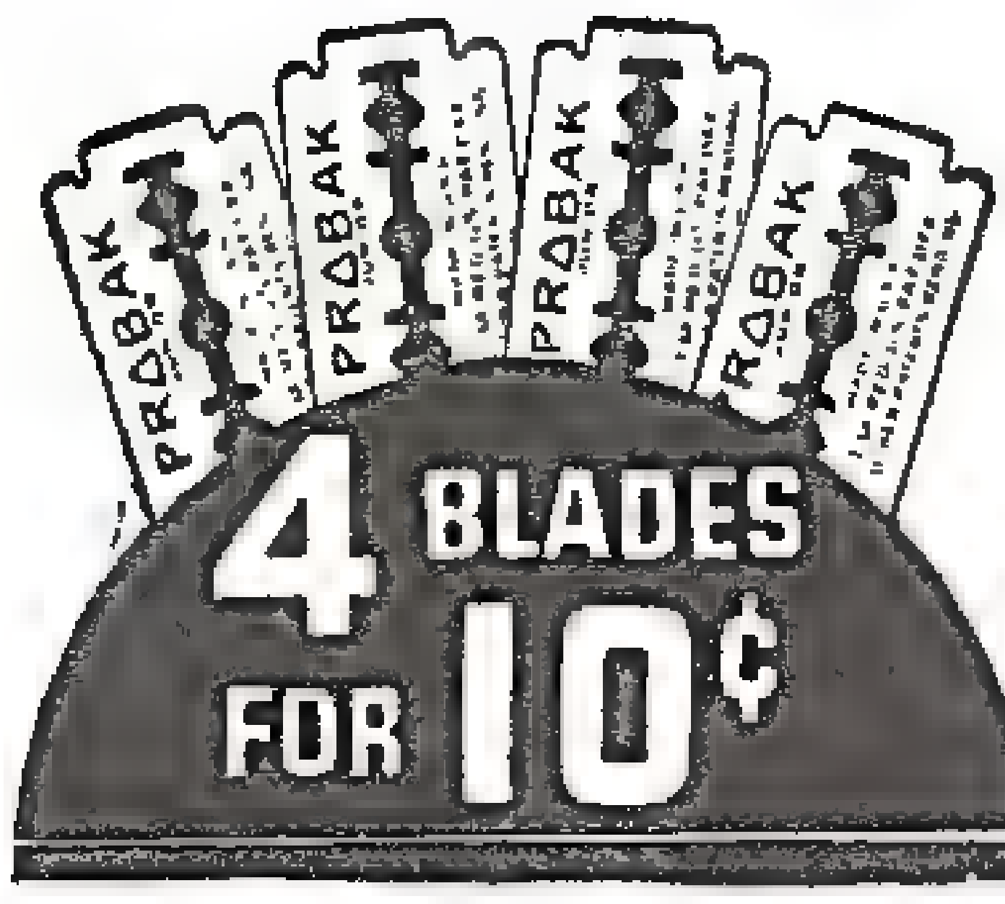
The front spring is now shortened. Only five short leaves are used and instead of the spring shackles hanging down from the perches they are up and on top as shown in the photo. The object here is to raise the front end higher so as to permit easier cranking and the use of longer spring leaves.

The lower main spring can be cut and welded, however the one used here was made from two old lower springs utilizing one shackle hole in each spring. These are cut 20 inches in length, measuring from the center of oil hole on shackle end. They are then lapped over each other—heated in the center to take out the temper, and a ⅜-inch hole drilled through both pieces for the center spring bolt. The other four leaves are then all bolted to the main leaves as in the original spring and spring clamps used at each end.

The next job is to install the Dodge transmission. First the front stub shaft is removed from the transmission and squared up to fit snugly into a Ford universal joint, which is used next to the motor. The drive shaft and housing is removed from the truck differential and the drive shaft may be discarded. The housing is used by cutting a 2½-inch length piece from the bell end measuring from the edge of the bell back as shown in the drawing. This is then welded to the small metal bearing cover on the front of the transmission. This completes the front universal unit and the transmission may now be set in place and bolted to the motor with the usual bell collar. The shift, however, will have to be blocked up while this is done and also lined up to fit the transmission brace.

The transmission is rigidly braced by using the old rear frame member from the T passenger car frame. This is already curved and is bolted to the front of the transmission and to the under flange of the frame with

[*Continued on page* 123]



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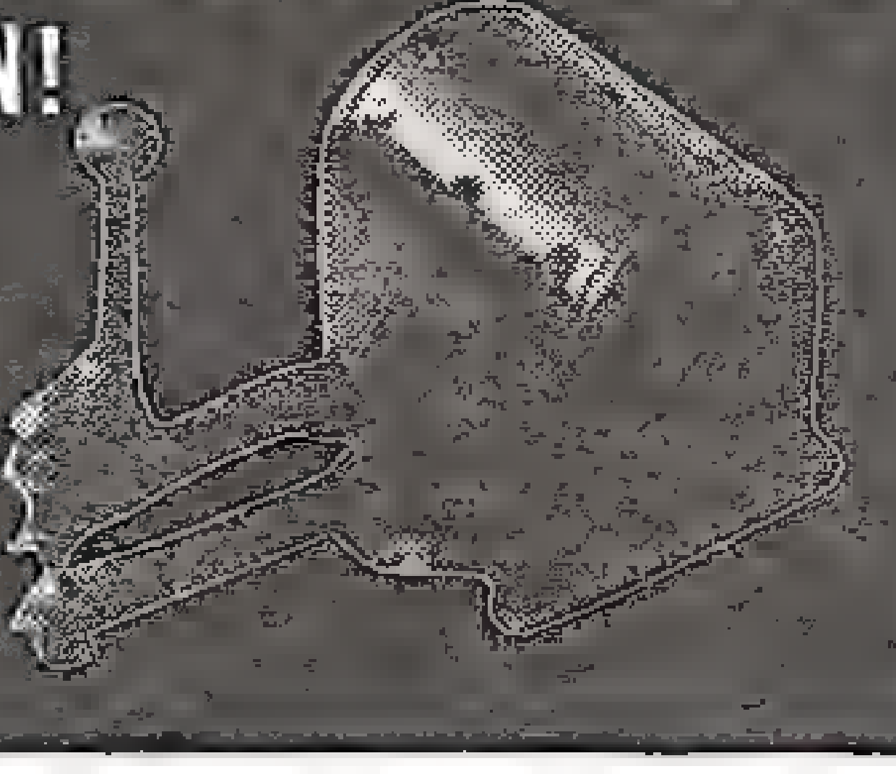

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OUR BIGGEST BARGAIN!
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Home craftsmen, sheet metal and sign shops, school shops, factories, tinners, autobody and fender shops, and a host of others can now do better work and make greater profit fabricating metals by the modern instantaneous method of welding by electricity with a New World 1000-Ampere Spot Welder at only $9.75 during the summer months. Operates from any 110-volt light socket. Capable of doing difficult work on 16-gauge and lighter sheet metal, or on rod, strip, etc., up to ¼" diameter or thickness, this low-priced spot welder, built to sell for $14.75, is just what you need in your shop. Fully guaranteed one year, it may be returned after 3-days' trial for refund of purchase price if not satisfied. Send stamp for folder giving information on this and larger models; or order direct and get absolutely FREE an arc welding attachment that operates from the spot welder transformer and will do all sorts of light welding, brazing, and soldering. Shipping weight, 50 lbs.

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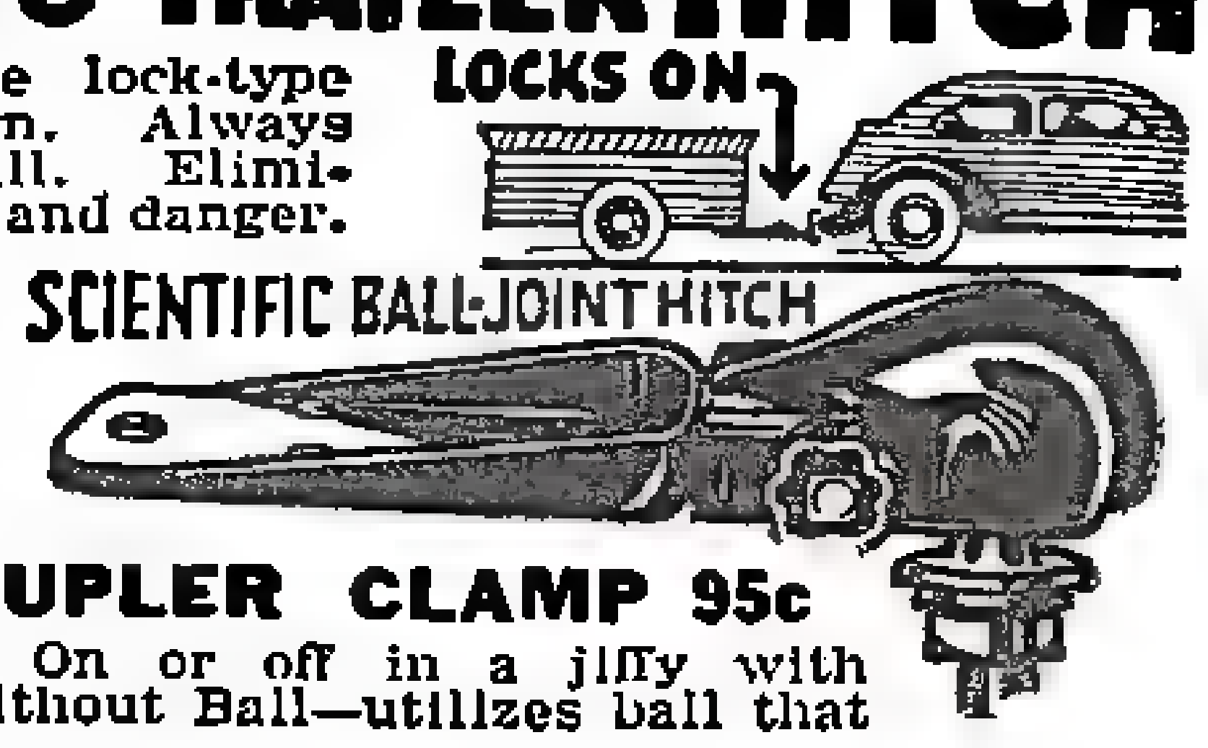

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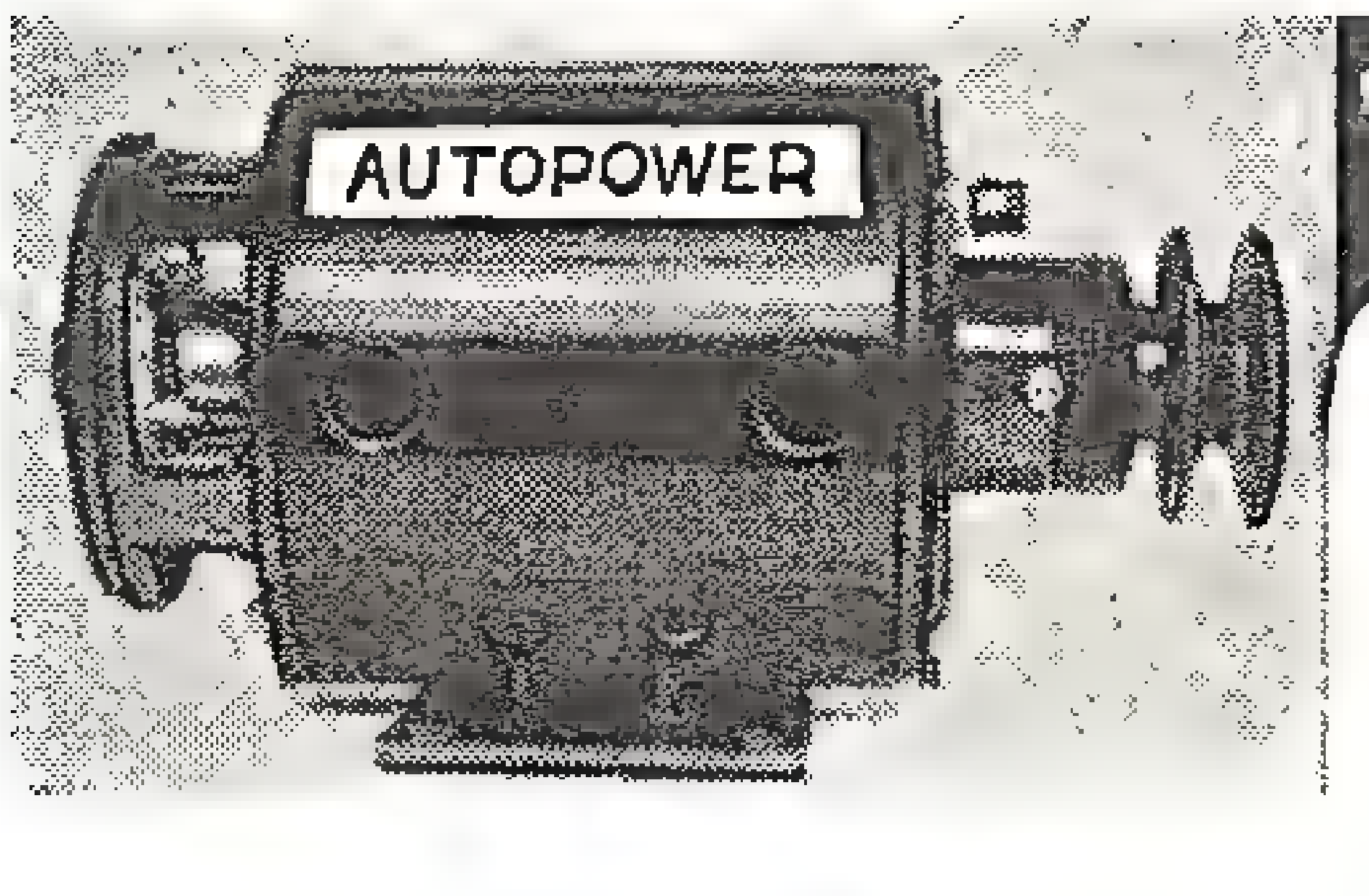

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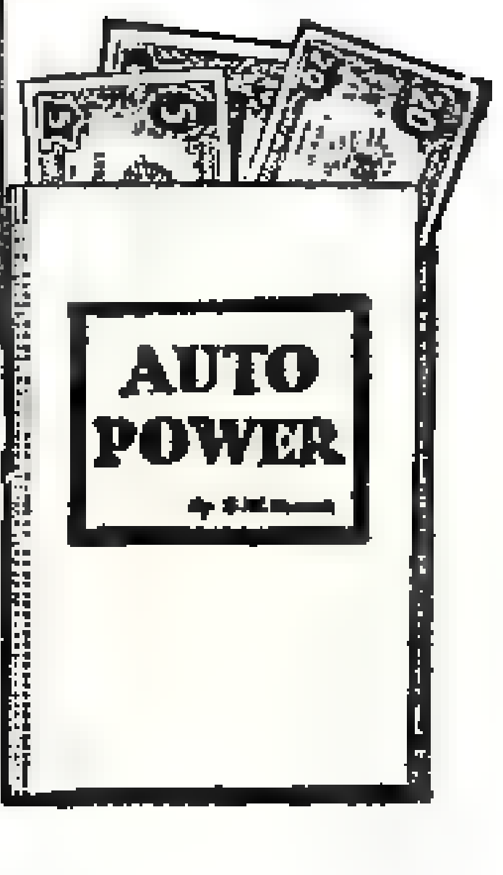

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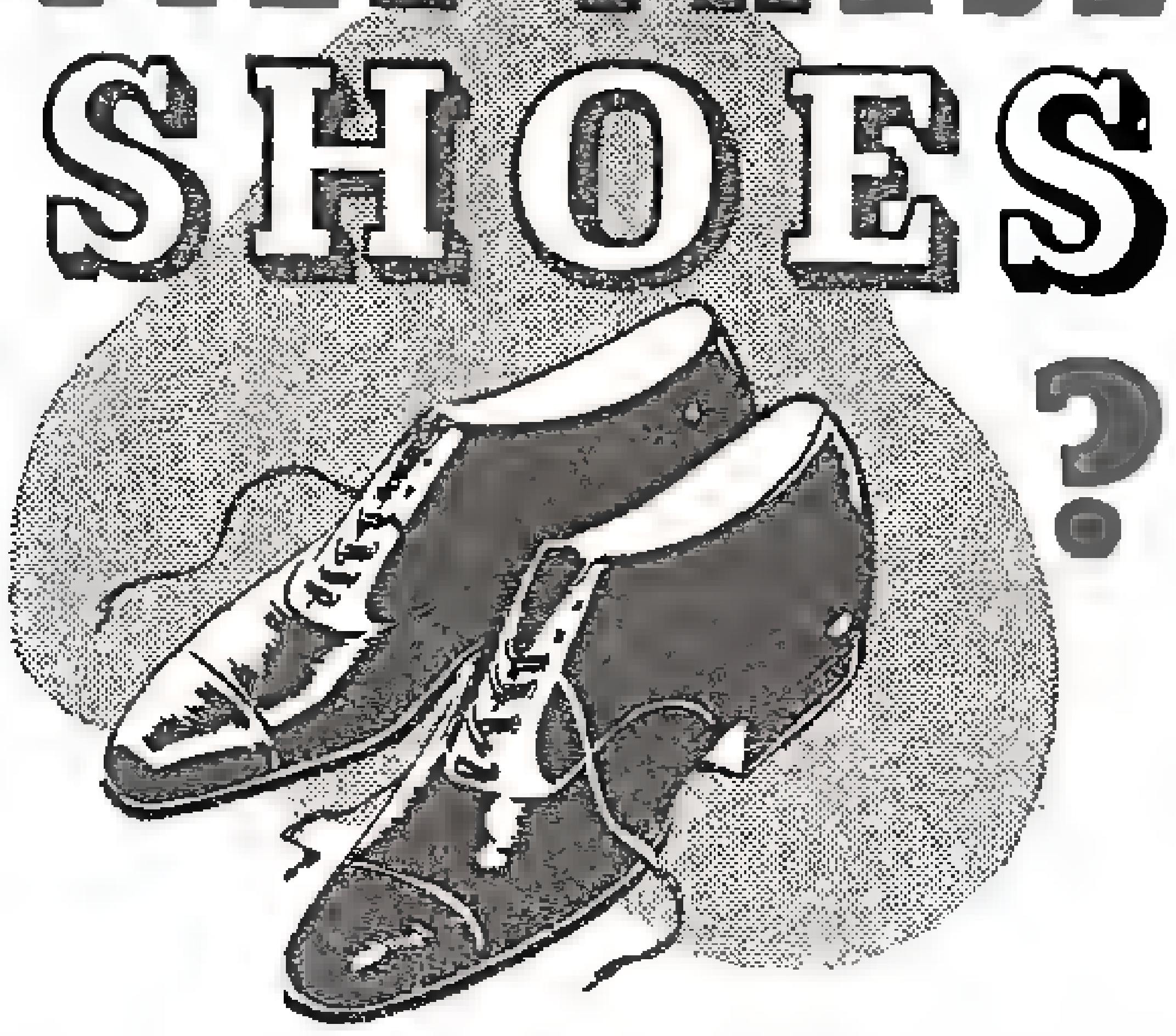

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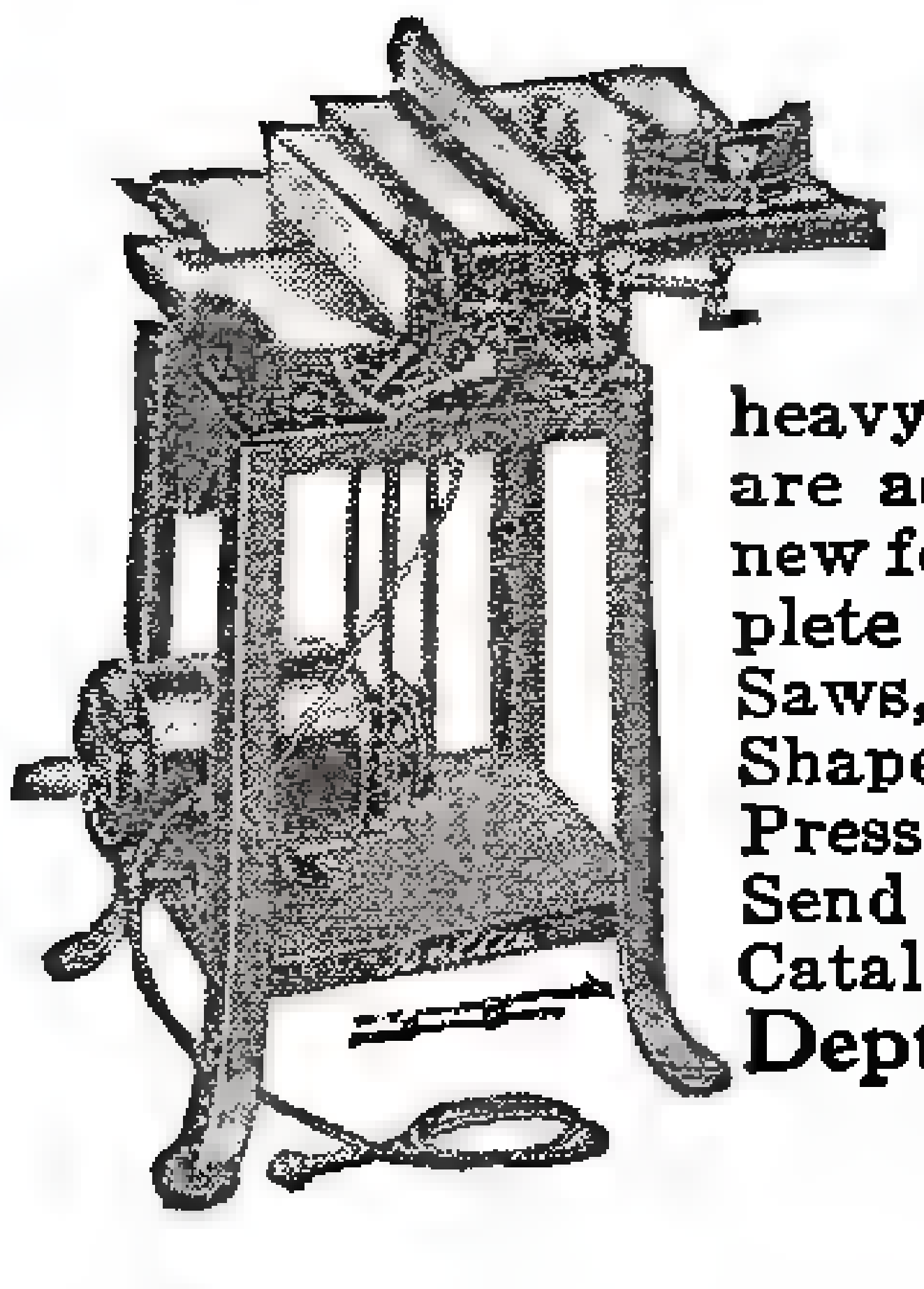

A Home Air Conditioner

[*Continued from page* 97]

access is possible for motor adjustment. A hole is cut in the top to take the lower end of the 16-inch pipe leading down from the cold air vent originally installed in the home.

To filter out dust particles from the air the filter frame is provided with cheese cloth or other suitable material not too closely meshed. This frame is built up of strap iron, the ends cut out with a hack saw or emery so they will be of the same thickness as the sides.

To provide disinfecting qualities to the humidifier, the filter cloth is immersed in a solution of chlorinated lime, about 2 ounces to a gallon of water.

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Enlarged blueprint plans for constructing the air conditioner, printed on tough rag content blueprint paper, are available from the MM Blueprint Dept. These plans will simplify construction and insure satisfactory results. The price of the plans is 50c postpaid. Order Blueprint No. W-640. Modern Mechanix Publ. Co., Greenwich, Conn.

Outfitting for the Canoe Trip

[*Continued from page* 75]

wilderness camping, it is a recommendation that the tent have a floor canvas sewed in.

While blankets can be used in conjunction with the regulation air mattress, there is something to be said for a lightweight, summer type of sleeping bag, kapoc filled, not eiderdown. Laid down on a full length air mattress, the combination is as perfect as modern inventiveness has been able to contrive.

In eastern Canada, as far as the Labrador and west of Hudson Bay, the so-called pack-harness on which to lodge the various bags containing the sleeping bag, duffle bag, food bags, etc., is generally in use. In western Ontario, Minnesota, Wisconsin, Michigan and portions of eastern Ontario, Duluth pack-sacks are the standby. Without doubt the pack-harness is the most efficient, although a large size pack-sack will hold an amazing amount of material.

Tump-straps, being broad leather bands that cross the forehead, are used both in carrying a pack-harness outfit and the pack-sacks as well. Pack-sacks having the regulation shoulder straps and tump-straps, permit one to carry a heavy load without exacting effort.

Food is carried in small bags, usually of muslin. These in turn fit into waterproofed or paraffined bags. By careful protection,

[*Continued on page* 126]

Build "Handy Henry" Tractor

[*Continued from page* 120]

studs as shown. The holes are marked by first lining up the shift, then holding the frame member against the transmission and up against the under side of the frame.

Don't Batter the Ball Bearings

We next take up the rear universal unit. Here a regular Dodge universal joint, bell housing and collar is employed. The stub drive shaft or worm gear is first removed from the truck differential and squared up to fit into the female end of the Dodge universal. Be careful, here, not to batter the ball bearing surface on the shaft. It should be squared up to within one-half inch of it. It might be well to have a capable blacksmith do this job and also the front drive shaft that is squared because they must be hardened to the right temperature. After this has been done reassemble the differential.

Next, measuring from the edge of the Dodge bell housing as shown, cut 1½ inches back. Then cut a 1½-inch piece from the rear end of the Ford truck drive shaft housing filing the Dodge stub housing slightly so it will slip inside of this ring. Be sure the bell collar is in between then have this welded all around.

Lining Up the Whole Assembly

Using a heavy cord one may now line up the whole assembly by looping the cord over the Ford magneto plug and measuring back to the spring perches on the differential. By trying the cord first on one side and then on the other will tell whether or not it is all lined up with the center of the motor. Check this closely as it is important that the whole unit be lined up before completing the rear assembly.

The distance between the under side of the frame and the top of the rear axle housing is 5¾ inches and this is blocked up by using two pieces of 2 by 6 hollowed out a quarter of an inch over the axle housing. Each wood piece, preferably oak, is then drilled and bolted to the under flange of the frame.

The truck radius rods are now cut off to the desired length and to fit at the side engine hanger bolts. These holes should first be reamed out to half inch. The radius rod is first heated and then bent to fit, then the holes are marked and drilled.

For plowing and heavy loads put the Dodge shift lever in low and let the Ford into high. However, you still have another lower gear if needed by shoving the Ford into low. One must use discretion here if the lug wheels are being used, for the low low exerts such a tremendous power upon the universal joints and shafts that something might snap if the load did not give.

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Odd Instruments Win Fame

[*Continued from page* 85]

sounding boards in Mr. Sevant's xylophone.

If the kitchen cupboard holds a sufficient variety of glasses and goblets, the amateur can experiment with musical glassware which Marshall Rogers has developed to a high point of artistry, as demonstrated on a recent Amateur Hour.

Sheer mechanical ingenuity comes into its own with the One-Man Bands. The problem here is to arrange a dozen instruments so they will be simultaneously available to the lips, knees, feet and hands of the lone artist who plays them all at the same time. Vincent Mundi, the Major's original One-Man Band, solved the problem in a striking manner and may serve as a model to others whose musical talents are suitable to wholesale reproduction.

More Prize Winners Announced

[*Continued from page* 79]

For this idea the judges awarded $5 to Mr. Torbert.

Awards of $2 each went to Capt. M. J. Shannon, of Los Angeles, Calif., for his suggested glass trap for kitchen sinks; Woodrow Wood, Springfield, Ohio, for his idea of a device for recording phone numbers of calls received while visiting; and R. C. Verhines, Springfield, Ill., for his novel cigarette tip suggestion.

The judges also paid $1 each to John Jastrab, Jr., Binghampton, N. Y., who recommended an automatic blackboard eraser for classroom use; George Hodson, of Gorham, Maine, for a device to remove slack from shop machinery belts; Elizabeth Wenzel, of Van Dyne, Wis., for an indicator that would warn typists when they reached the bottom of the page. The final award went to L. Hohtweigler, of Aurora, Ill., for his suggestion for a device which would combine a weighing device with a slicer so that pressed meats might be cut without waste.

Read the following rules and send in your idea of a much needed invention:

1. In 100 words or less explain your idea for a needed invention.
2. This contest is open to everyone except employees of Modern Mechanix Publishing Co.
3. You don't have to buy a copy of the magazine or be a subscriber to enter.
4. Write you name and address plainly on your entry. No entries will be returned.
5. The editors of this magazine will be the judges. All decisions will be final.
6. Mail your entry to Inventions Contest Editor, Modern Mechanix Publishing Co., Greenwich, Conn. Entries for this month's contest must be mailed before July 1, 1936.

Lighting the Way for Color Movies

[*Continued from page* 38]

the dancers in this scene would make a scraping noise during the dance ensembles.

The costumes of the dancers, while colorful as are Spanish costumes, are not garish or over-colored as would have been the case in "Becky Sharp" or other earlier color productions. The colors are warm and have just enough brilliance to make them stand out from the color of the set, a problem which was solved by Robert Edmond Jones, the noted stage designer who is also the Art Director for "Dancing Pirates."

New discoveries in makeup by Max Factor, who collaborated on the technical problems and tests before the production was started, resulted in a makeup that gives a smooth texture to Steffi Duna's and the other players' faces. While the earlier makeup was mask-like and oily, the new Technicolor makeup is about the same color as natural skin, except for a slight blue quality, and it may be applied so thinly that the pores of the players' skin show under the makeup, which gives a freedom of the facial muscles and permits a more facile play of expressions. Little or no rouge or lipstick is used; in fact, so thinly is applied the makeup that Steffi Duna bites her lips each time before appearing before the camera in order to increase the natural blood flow to the lips.

The Technicolor camera is the result of experimentation since 1916 when Technicolor first began. While the black and white camera "shoots" only one negative at a time, the Technicolor must take three separate negatives simultaneously. Each of these negatives is a record of one of the three primaries, red-orange, blue-green, and yellow. (See "How Movies are Colored," Modern Mechanix, July, 1935.) The negatives are made by a prism which splits the light ray, after which it is filtered and the three negatives photographed. The prism is behind a single lens and the negatives are rolled up in three separate rolls in a large magazine. The whole camera is housed in a huge "blimp" which prevents the noise of the camera mechanism from interfering with the sound recording. A new device consisting of two Selsyn autosynchronous motors permits the cameraman to focus the camera from remote control; that is, in moving shots, the cameraman may be twenty or thirty feet from the camera and still keep it in focus.

The complete camera unit with camera, "blimp," and "Velocilator" (which serves instead of a tripod so the camera can be made to follow action) weighs 1,150 pounds.

The new improvements in color movies make it possible to record the delicate tones of nature and successfully bring to the screen the things seen by the eye in real life.

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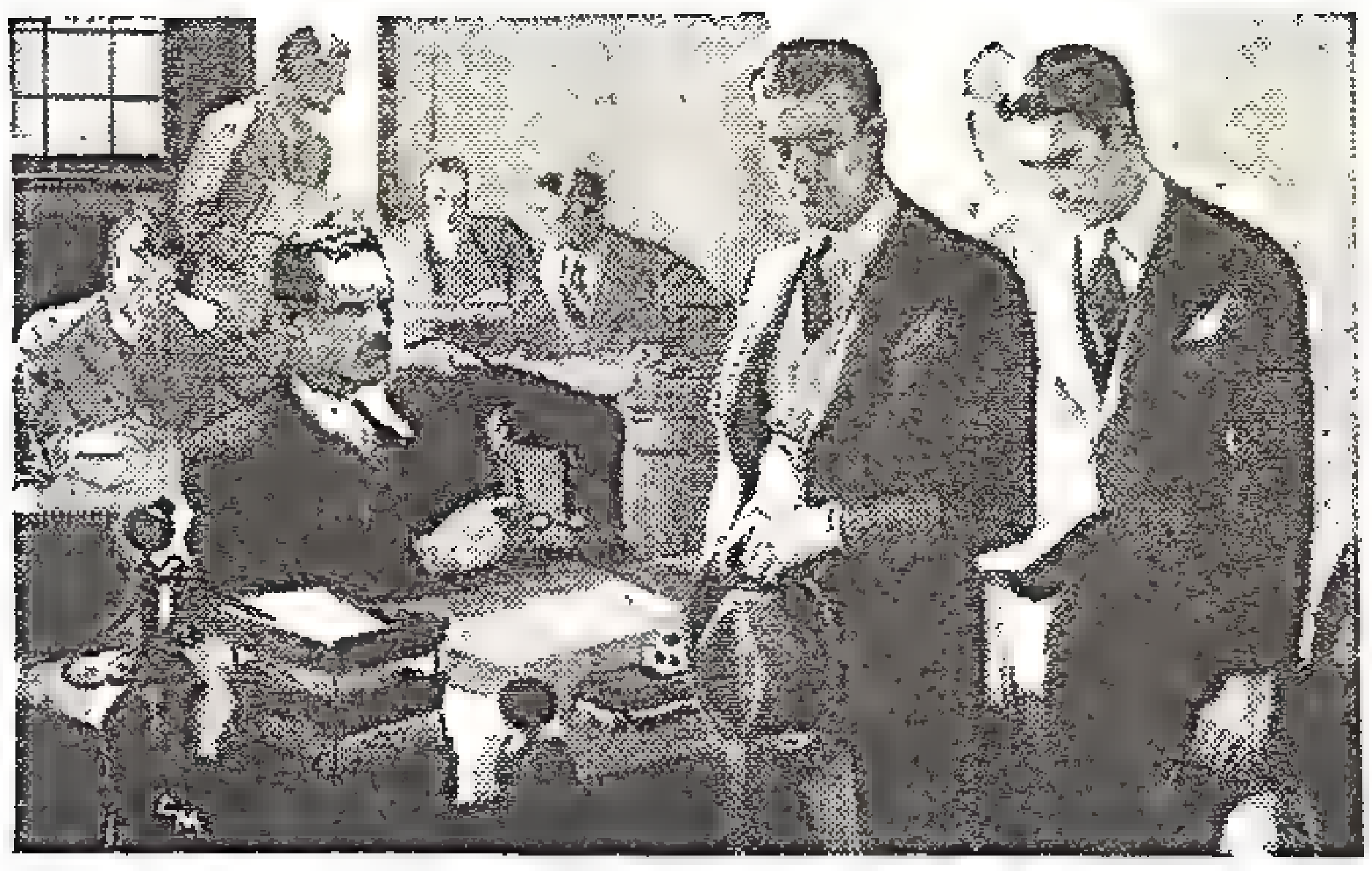

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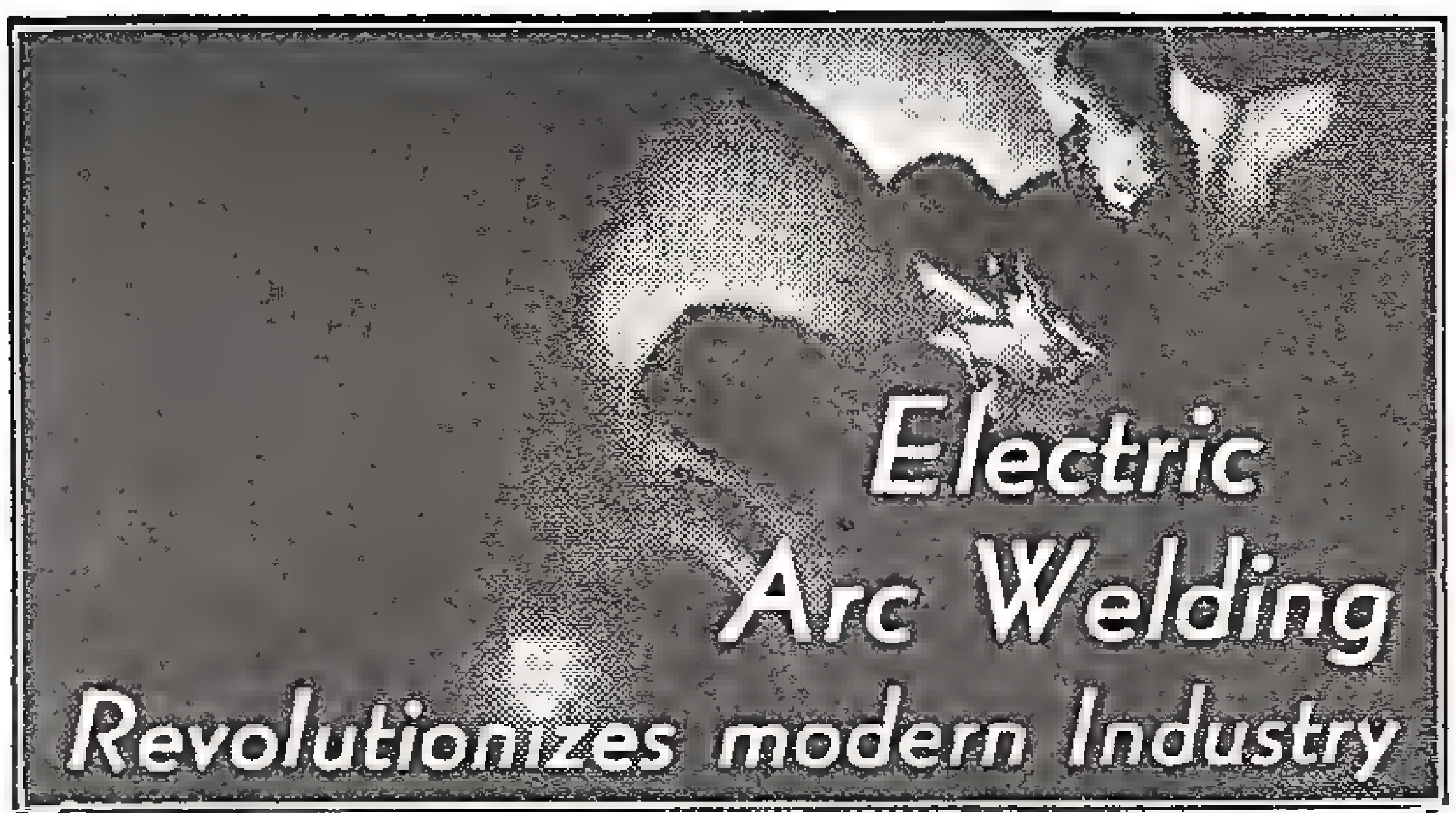

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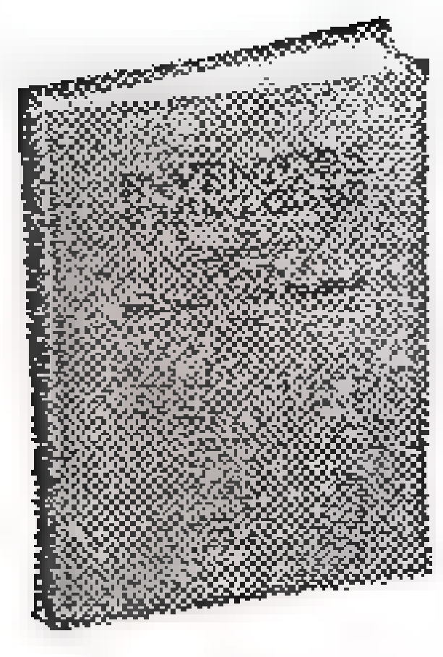

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A Novel Sword and Shield Sundial

[*Continued from page* 107]

metal cutting blade. Before laying out the shield it is necessary to first know the latitude of your location. This is easily found by referring to a map and locating your town with respect to the parallel of latitude given at the right or left of the map. Let us assume that this is found to be 42 degrees. Subtracting this from 90 degrees you have the complement of this angle or 48 degrees. On the shield draw a line across the top of the hole for the sword. This is the VI—VI line in Fig. 2. Now draw a line from the point of the shield to this hole. These lines are at right angles to each other. Refer to the chart shown in Fig. 2-C and on this locate 48 degrees on the quadrant lines. Now place a straight edge at the center of the shield, intersection of VI-VI and VII o'clock line, and draw a line from this point to the point where the 48 degree line intersects the curved lines. In Fig. 2 the dotted lines stop at this point. Now continue this line to the protractor scale and read the number of degrees. Now using a protractor on the shield at the intersection of the VI-VI and XII o'clock line mark out the angle as obtained from the scale.

Outfitting for the Canoe Trip

[*Continued from page* 122]

dampness and water will thus have no effect on your store of food. All seasoned trippers are of the opinion that you cannot protect your food too well.

A list of food supplies and other essentials connected with the cooking end of the camping pastime, involving two persons for a space of time extending over ten days lists about as follows: Two 1-pound cans of vegetable shortening; 8 pounds of bacon; 4 pounds of flour; 5 pounds of sugar; 2 pounds of rice; 3 pounds of navy beans; 1 pound of salt pork; 2 pounds of coffee; 8 loaves of bread; 1 can of powdered eggs (which equals 4 dozen fresh eggs); 1 peck of potatoes; 2 pounds of salt; 1 can of pepper; 4 pounds of dried fruit; 1 box of matches; 3 pounds of onions; 1 can of kitchen cleanser; 3 yards of toweling; 2 plumber's candles, two-inch size;; 2 pounds of butter; ¼ pound of baking soda; and 1 bar of laundry soap.

The above are essentials, those items, in fact, that can hardly be left out. Following are some additions that are not out of place: 2 pounds of brown sugar; 1 package of hardtack; ¼ pound of tea; 6 cakes of sweet chocolate; 2 pounds of oatmeal; 1 pound of raisins; 2 packages of spaghetti; 4 pounds of ham; 2 pounds of corn meal; 2 pounds of cheese; and 2 pounds of split-peas.

Detective Smashes Police Ring

[*Continued from page* 53]

under desks, in desk lights, under chairs in which certain officials sat.

The method of listening to conversations and taking them down in shorthand soon proved cumbersome and slow. To be of any use later as evidence, the shorthand notes had to be transcribed, and this in itself was a herculean task. So Jamie went on a hunt for a short cut.

He found what he wanted in the pamograph, later to be known as the "mechanical stool-pigeon." This machine, built like a portable phonograph, recorded conversations on an aluminum disk, cutting them deep into the metal with a sapphire needle. The tapped telephone lines and the dictaphones were rigged so that they could be switched to the pamograph in a moment's notice.

Jamie naturally was acquainted with signal devices of all kinds used in public safety work and now he turned his attention to the apparatus used in fire department offices to punch out on continuous tapes the record of fire alarms sent in from alarm boxes.

Ticker Tape Records Telephone Numbers

He set to work to fit one of these recorders to watch through the silent hours of the night in his office.

Should a police official, to take a number not used in St. Paul, call Duncan 3224, the record on the tape the following morning would show 3-8-3-2-2-4.

The regularity with which certain numbers were called led to undercover operations which served only to fashion more firmly the case Jamie was building up.

Janitor Tips Off Jamie's Plot

The tip-off came one day when a janitor was repairing a ventilating shaft leading to the office of a high police official. In the shaft was found one of Jamie's high-powered dictaphones and the officials realized instantly what had been going on. But Jamie had been in operation for four months and had secured more than 400 disks of incriminating conversations. These were placed in the hands of the mayor, the city attorney and the county attorney, and immediately three detectives and a patrolman were dismissed and a number of other officers, including the chief of police, were suspended.

Jamie now came to his reward. In the resultant shakeup in the police department, he found himself made assistant commissioner, a post next to that held by Warren. Later he was invited to join the force of a large private detective firm in New York City at such a salary that he could not possibly turn it down.

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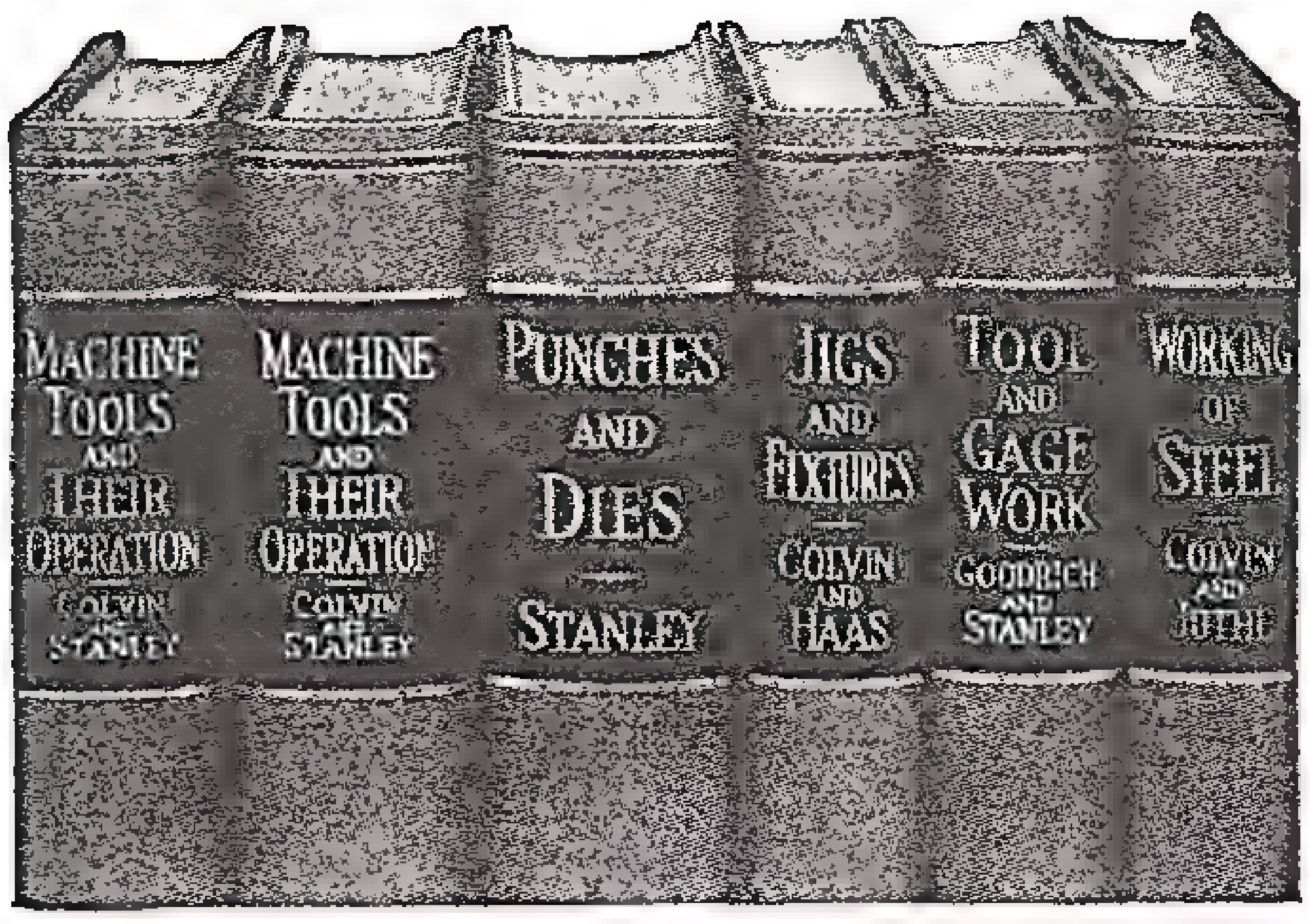
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EVINRUDE 1936

Splitting Waves With Outboards

[*Continued from page* 70]

steering and its backward flow has the effect of counteracting the forward drive of your propeller. Even the V-shaped stretch of water between the two diverging lines of another boat's wake, while it is smoother, still has enough backward motion to cause a noticeable reduction in speed in the trailing boat. If the leaders are so spread out over the course as to make it impossible to find smooth water, a boat may be jockeyed onto the down-hill side of the waves set in motion by one of the leading boats and gain speed from its forward sweeping motion.

Smooth Hull Important To Speed

It is important, too, that a boat be absolutely waterproof and thoroughly dry inside before a race. It is surprising how much a little water in the bottom of a boat will weigh, and how much it will do to retard speed. The hull should be kept smooth and well caulked. If the finish is rough or chipped, it should be removed, the hull sanded, and fresh paint and spar varnish applied. A boat will plane better and develop greater speed, too, if a thin coat of graphite is spread over the bottom just before a race.

Because of the power and speed these modern motors can develop, there is no longer much need for drivers to spend hours "souping up" or rebuilding them as they did a few years ago. However, it is important that they be kept tuned up and there are several ways in which their efficiency may be increased.

Pistons should be balanced in scales and if any difference in weight is found they may be filed down until they balance perfectly. The crank shaft, too, may be ground down to a perfect balance.

Remove Muffler To Reduce Back Pressure

All gas passages, including the venturia tube, should be polished and filed to remove all irregularities or burrs in the castings so as to increase the free passage of fuel. Check piston rings and adjust all bearings so there is only enough play to allow for expansion when the motor heats up. Compression may be increased by removing the head and filing it down to reduce the space in the firing chamber. The muffler should be removed to reduce back pressure, although the use of outboard motors without mufflers is prohibited in many places, except when they are in actual competition.

The majority of racers now use fuels which are blended and sold commercially, a few still use a solution of 75 per cent wood alcohol and 25 per cent benzol to every gallon of which is added 1½ pints of castor oil, as the fuel and lubricant are used together.

[*Continued from page* 29]

paratus, while another microphone will amplify the speech so it may be heard in the farthest corner of the hall. So far there is nothing unusual about the procedure.

But there are a thousand delegates seated on the floor of the hall, each of whom has the right to speak when he has been recognized by the chairman. Actually, each state delegation has a spokesman, who is authorized to speak for all.

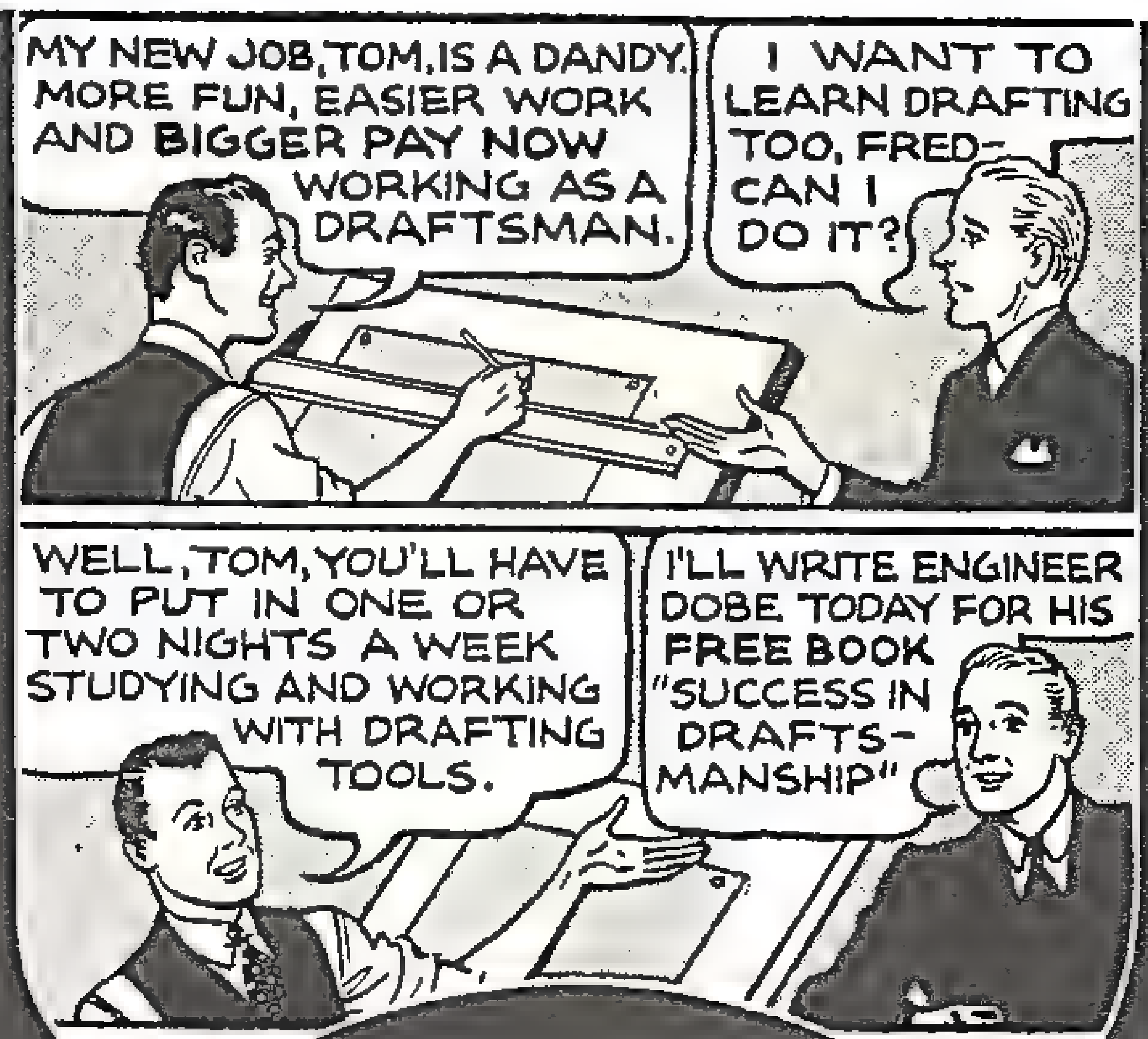
Pages Will Carry Microphones

Owing to the size of the meeting, it would unnecessarily delay the business of the Convention if every delegate desiring to be heard had to mount the speaker's platform. To obviate this there will be ten microphones suspended from the ceiling, each mike in charge of a page boy. When the chairman recognizes a speaker on the floor, the nearest boy will bring him a microphone, into which he may speak, while the switchboard operator plugs in that mike to the loud speakers, radio and newsreels. It will be futile for anyone to attempt to shout down a speaker, once he has the exclusive use of all sound facilities.

Howard Leland Smith, the architect for the Democratic Convention, has designed a way of taking care of newspapermen that will do away with the complaint that the most favored pressmen had the worst seats. Press boxes at such affairs have usually resembled two huge sections of grandstand, sloping downward toward the center, so that the representatives of the big press associations and largest papers have been directly under the speaker's stand, unable to see, and often to hear, what is going on. Smith has reversed this arrangement, elevating the center of the press box, and sloping it downward toward the ends, thus enabling all to see and hear. This press box has been placed over the orchestra pit, with press rooms directly beneath.

Newsreels Will Be Active

Three platforms have been erected for use of the newsreel cameramen. One, a double deck affair, will be at the edge of the stage, so the camera may catch a profile view of the speaker, or may be turned outward to take in the Auditorium floor. Two other platforms will be erected 120 feet from the speaker's platform, at either side of the hall. The cameramen here will use telescopic lenses. Accredited newspaper photographers taking stills will be permitted the run of the auditorium, mainly because those in charge realize the futility of trying to confine their activities to one spot.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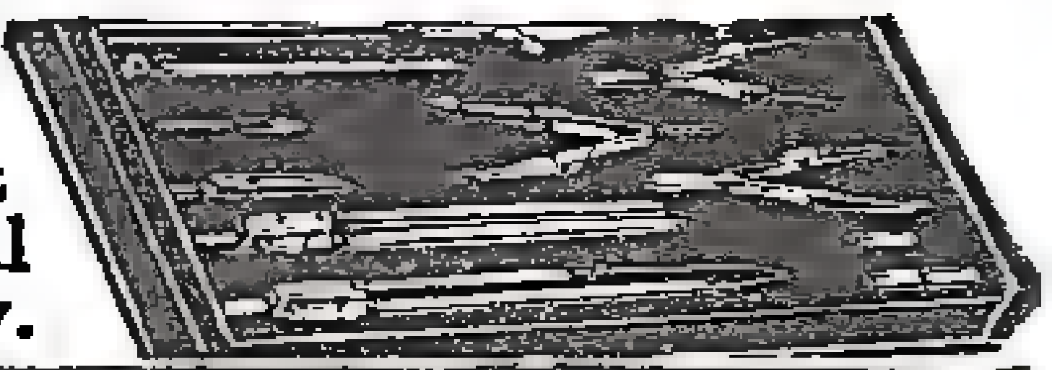

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Paint Wisely and Save Money

[*Continued from page* 111]

curely adhering edges, HAVE THE OLD PAINT REMOVED COMPLETELY for a really first-class job.

In repainting over this old coating, use a hard type of paint, preferably the same as was used previously. Use a real oil paint which contains no heat-treated oils or varnishes that tend to give enamel-like consistency to a paint. A real oil paint properly mixed will show brush marks, but it will fill the flaked patches better and more nearly conceal them than a paint containing oils treated to give quick drying or freedom from brush marks.

Moisture Under Paint

One of the most frequent and costly causes of premature failure of paint is moisture getting behind painted woodwork. The conditions are greatly aggravated when the temperature on the unpainted side is materially higher than that on the painted side, as is the case on the outside walls of heated buildings during cold weather. Under such conditions good paint may fail within a few months, leaving a surface that is unusually expensive to repaint properly.

Blisters are unmistakable signs of moisture in the side walls. If you must be convinced that there is moisture behind the boards, allow a carpenter to remove a board of siding, which he can replace without damage. Blistering is found most often in late winter or early spring. Later in the season the side walls may dry out again and the blistered parts of the coating become flabby or even sink back to almost their original position. Blisters may break and peel soon after they form, but often they merely dry out and shrink back. When the coating becomes more brittle as a result of weathering for a few months longer the blistered areas crack open and scale off.

Some Homes Are "Chronic Peelers"

If your home is a "chronic peeler," it is useless to repaint it, even if the old coating is entirely removed, until proper steps have been taken to keep moisture from getting behind the painted boards. There is no way in which houses can be kept properly painted at reasonable cost until construction practices afford dry side walls at all times. Care must be exercised that in new buildings the plaster is properly dried, that no rain water can seep through leaky joints left by poor carpenter work or faulty design which leaves inadequate flashing around windows, chimneys, dormers, eave troughs.

Stingy application of paint and too much thinning of priming coats often cause difficulty in paint jobs on new wood surfaces.

Hidden Hazards of Circus Thrillers

[*Continued from page* 51]

One of these is Edward Van Wyck, of Cincinnati, Ohio. He has a small mechanical work shop in Cincinnati and in this little factory rigging for such circus stars as the Cristiani Troup, Con Colleano, Mrs. Tom Mix, formerly one of the flying Wards, Ira Millette, Joe Cook, Martin & Martin and hundreds of others, is made. He makes apparatus from ideas suggested by performers. If a performer has an idea for a certain piece of mechanical equipment for his or her act, they go to Mr. Van Wyck who works out and perfects the apparatus.

Mr. Van Wyck, who was at one time a professional juggler, has been making circus and juggling equipment for some thirty years.

Good Apparatus Necessary

Good mechanical apparatus, and particularly individual creations, are very necessary to the circus performers' success. A bounding wire performer must have accuracy and the exact proper elasticism in the huge springs that create the rebounding power in his wire. Clowns have created their biggest laugh hits with the use of mechanical devices of various kinds from the funny fliver to the hatchet in the head. The hatchet in the head stunt is done by placing a piece of wood beneath the clown's wig. The hatchet is made from wood also and couple of small, sharp nails protruding from the blade of the hatchet does the trick. When one clown bangs the hatchet down upon the top of another clown's head, under whose wig there is wood arrangement, the weapon sticks, and looks as though the blade was buried in the poor jester's skull.

The Human Cannonball Act, in which the two men are shot from a huge cannon, is strictly a mechanical perfected and executed act. The act is done by Hugo and Victor Zacchini. They are both shot out of the cannon at the same time, with Hugo coming out a few seconds ahead of his brother Victor. They land in a net some 100 feet from the cannon. The entire apparatus they use cost $40,000.

Use Compressed Air In Cannon

What really shoots them out of the cannon is not a force created by huge springs. Some cannon acts have used the spring mechanism but the Zacchini Brothers use costlier compressed air. By carefully gauging the air pressure, they know to the inch where they will land. Springs, subject to weather conditions, are temperamental, and have rocketed several men to their death. The real working details of the Zacchini Brothers big gun are known only to them.

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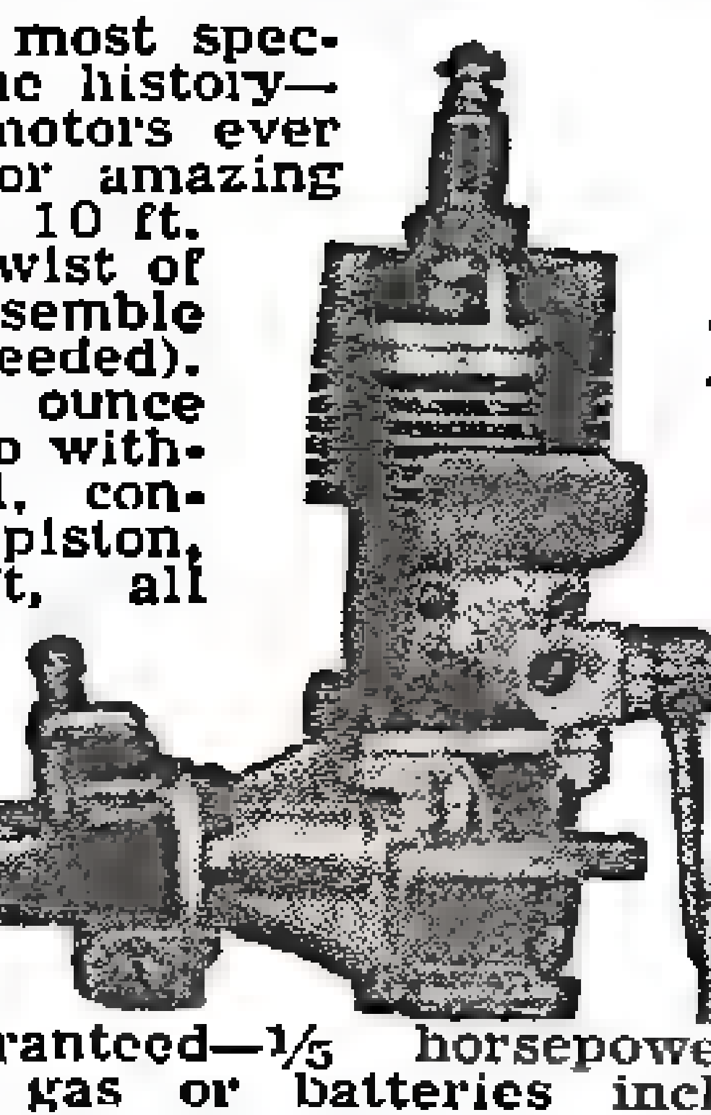

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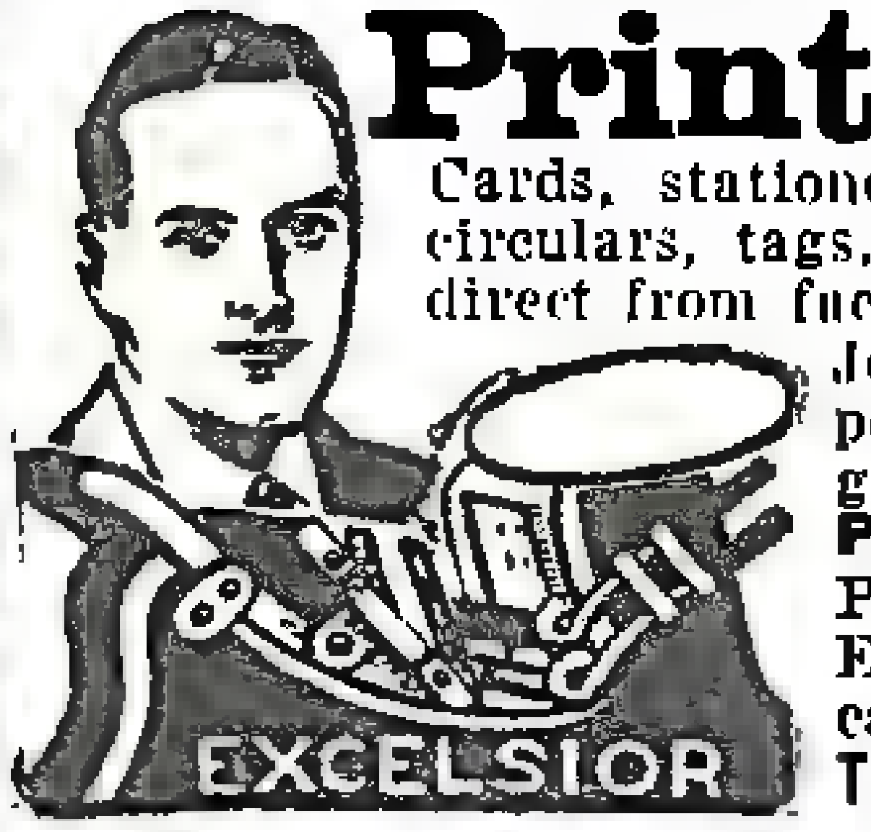

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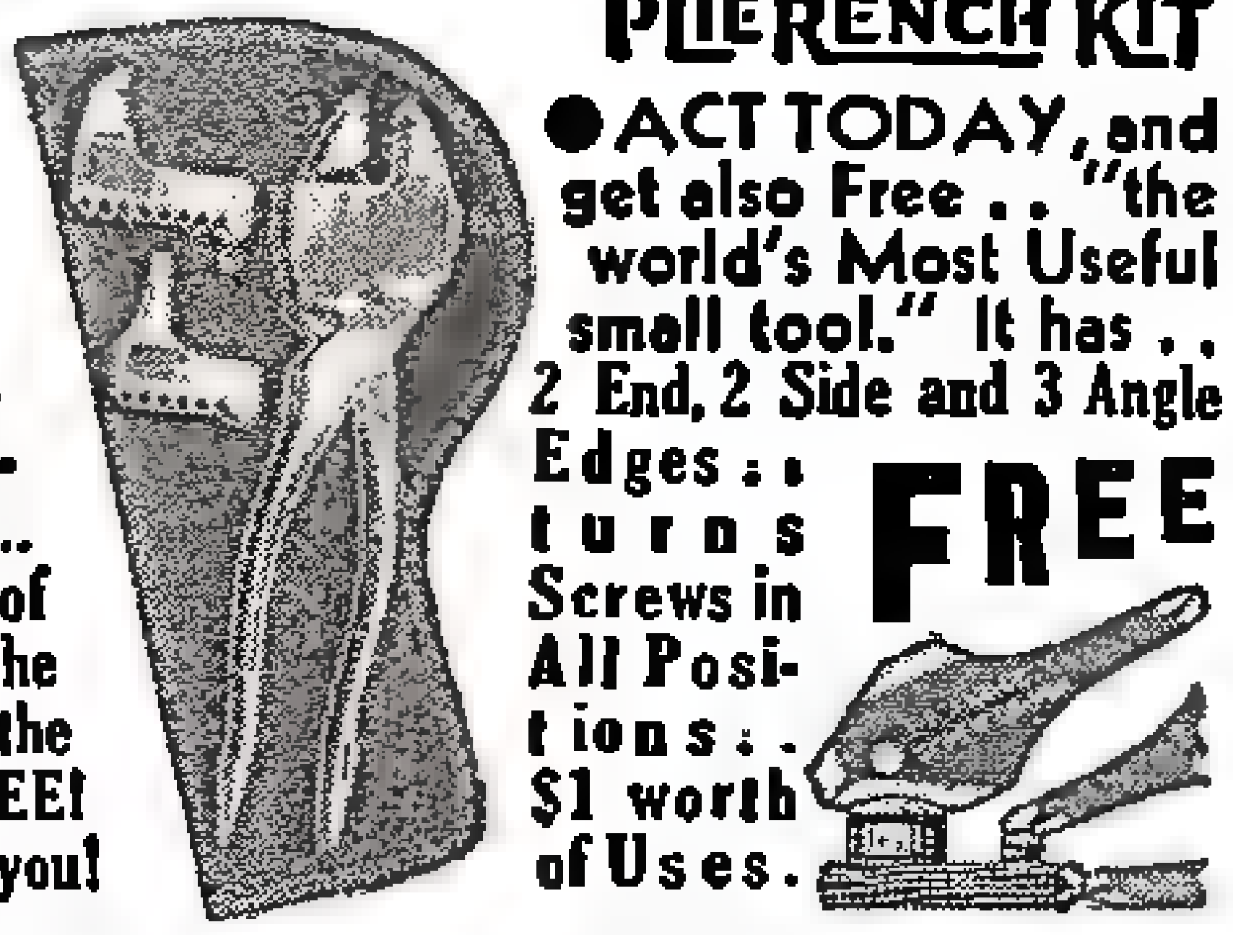

Cartoons Gain Third Dimension

[Continued from page 59]

part of the secret of the process. Between the camera and the set is a frame on which the celluloids with their drawings are mounted. The camera photographs through the celluloid and includes the background, so that the characters seem to be walking on the set. Between the lens and the celluloid, cut-outs of trees or other objects can be mounted. Thus the completed film presents a single picture of objects actually photographed in three vertical planes.

This alone, however, is not enough to give the illusion. Ordinary camera lenses are set for infinity, which is an imaginary point as many miles distant as vision may reach. Mr. Fleischer's cameras, however, have the lenses set for an infinity of six feet, which is the imaginary vanishing point of the set on the revolving table—the pivot around which the set moves.

When the table revolves, the portion of the set which is closest to the camera seem to be moving more rapidly than sections nearer the pivot. The human eye is accustomed to viewing things in its own manner, so when a film made by this process is projected, the spectator unconsciously reconciles the false vanishing point with his perspective.

Win A Soapbox Racing Car!

[Continued from page 57]

ment, ball bearing, true tracking, and free of friction to such an extent it can be set rolling by blowing the breath upon it.

The rest of this novel assembly is covered in the drawing. The doenut wheels can be fitted by merely bolting one end of the ball bearing axle to the U.

The best frame is by all odds the 1⅝"x1⅝" fir longeron idea, with plywood bulkheads, plywood floor, and galvanized iron hood, all screwed into one boat like box and mounted on the coil springs over the axles. This gives a body which is made rigid because of its covering. It is stout, and comfortable, being of the hammock type.

The drum and cable method of steering, because the size of the drum can be adjusted to give fast or slow turning action, is the best. It can be easily adjusted, and if you use pulleys with stranded cable, or wire rope, you have a strong method of steering that is geared to the proper leverage and speed.

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Brig. Gen. Arnold Surveys Flying

[*Continued from page* 61]

steel rails or tarviated highways, yet it is almost as definite as if it were.

Along this route are emergency landing fields built by employes of the Department of Commerce; beacons stand at regular intervals, the distance depending upon the character of the terrain, to light the way by night. At all the larger cities along the course will be found other landing terminals as complete and extensive as the airport of departure. As the plane flashes along the course the pilot will "check-in" at frequent intervals by radio voice with men who sit, day and night, beside the radio switchboard to keep track of planes in transit.

Airplane Manufacture Comes First

Now we shall consider in greater detail the primary ramifications of the new business, always with the end in view of showing the proportions of each, the numbers employed, and the degrees of skill required.

First, the manufacture of aircraft. There was a time when airplanes were built in sheds, in blacksmith shops or even in the open. That was long before they assumed their present sizes and proportions. Today, ten principal factories in the country build 90 per cent of the nation's aircraft. They are built in tremendous establishments, covering thousands of feet in floor space.

Engineering Field Is Highly Specialized

Aside from the business executives, some of whom have grown up with the industry and others of whom have been in banking, law, and other professions, the principal profession represented is engineering. These engineers are men with college training, followed, generally, by practical experience in the drafting or design rooms of aircraft manufacturing plants. In recognition of the present requirements for aeronautic engineers many of the larger universities have installed special aeronautic courses.

The department, section or shop foremen are also men especially trained and educated, and they draw good salaries. Under them come the artisans, the men who work with their hands. There will be found carpenters, blacksmiths, tinsmiths, tool makers, die makers, instrument repairmen, and general mechanics. Such plants employ a large number of common laborers, clerks, typists, and general utility men and women. At its peace-time peak several of the large plane and engine factories employ more than two thousand people in a single plant unit.

In addition to plants and factories devoted entirely to airplane manufacture, many affil-

[*Continued on page* 134]

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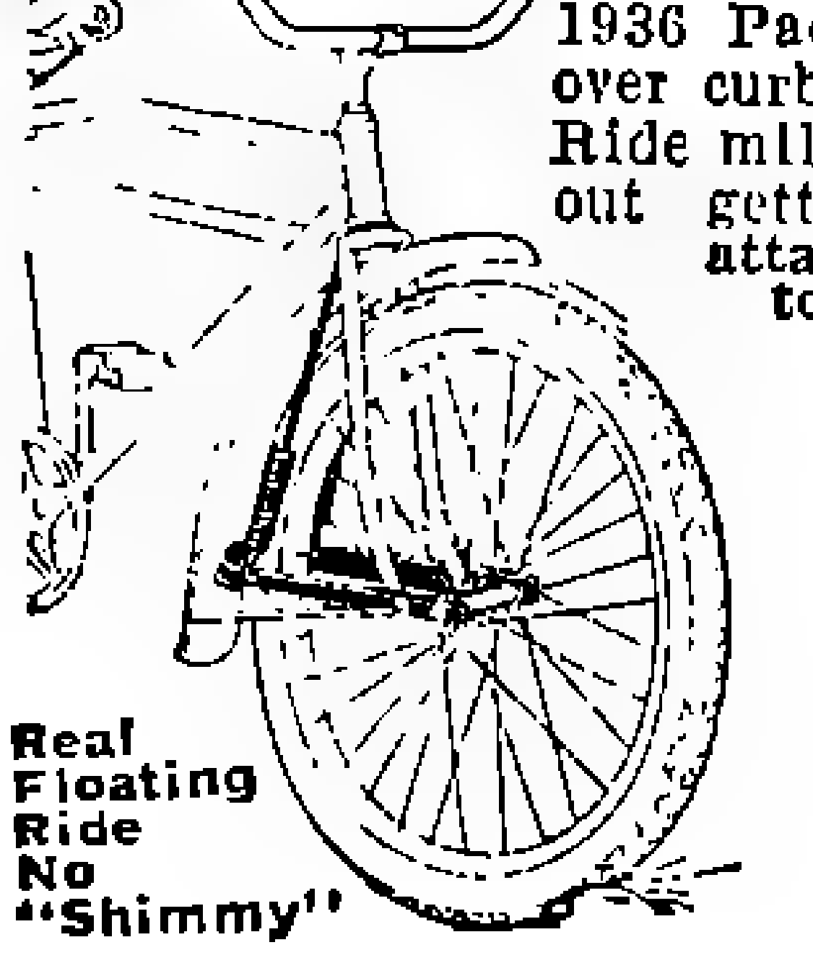
PACKARD KNEE ACTION CO., Dept. C-963,
4306 Marburg Ave., Cincinnati, Ohio



Brig. Gen. Arnold Surveys Flying

[*Continued from page* 133]

iated industries have felt the effect of this growing, new business.

Along the slopes of the Pacific Northwest, scouts are hunting lumber, perfect spruce, to build into aircraft spars and longerons.

Mention has already been made of the new metal, dural, used largely in transport and war-plane manufacture. The necessity for this provides work for metallurgists, work for aluminum alloy plants, and production of the raw material in no mean proportions.

The necessity for the many plane and engine instruments special to aircraft provides employment for a considerable number of skilled watchmakers and allied artisans in the instrument field.

Oil Industry Feels Boon Of Aviation

Mention has already been made of the boon to the oil industry resulting from the special requirements of aircraft power plants. This necessity has led all the leading oil companies to install special aviation units to supervise the provision and distribution of these products.

Providing airplane clothing has furnished work to many. Aircraft engine manufacture has been a distinct aid to the steel producers and their employes. When it is realized that more than six thousand airplane engines have been built in this country in a year, the effect upon the steel industry and its affiliates can be realized.

Then there are the men needed for airway and airline installation. Many employes of airlines and of the Airways Branch of the Department of Commerce are necessary to provide a safe causeway for the misnamed "trackless traffic." Radio operators, four to five in number, are required at each stopping point and weather station.

Mechanics Needed At Way Stations

Each way-station along the route employs licensed mechanics—airplane and engine—for the service of the craft which pass through. These men are especially schooled. They get their Department of Commerce licenses only after stiff examination and long apprenticeship.

The larger terminals afford employment to a multitude of varying tradesmen, mail handlers, bootblacks, clerks, typists, barbers, bell-boys, restaurant waitresses, signal men, gatekeepers, guards, and unskilled and unclassified laborers, in addition to the regular airline employes connected with plane traffic.

As to pilots and co-professionals: There was a time when any enterprising young man possessed of the urge and the courage could learn to fly for a few dollars per hour. Perhaps that can be duplicated yet, but the student who completes one of these brief courses will find that there is no place for him in the industry. He has simply wasted his time. The airline pilot in demand today is a professional. He is a professional because of the high standard set for original selection and because of the time and funds required to complete his instruction. Another characteristic that airline pilot training has in common with the professions in the long apprenticeship, similar to the interne period of the young medical graduate. A thorough pilot's course will require a minimum of one year. The applicant should have at least a high school, and preferably a college education. In addition to learning the rudiments of pilotage, he will be taught mechanical subjects to familiarize him with the equipment he is to use; he will receive radio instruction because he will have to operate radio equipment constantly when he becomes a co-pilot. He will be given courses in meteorology and map reading.

Good Navigators Are Scarce

Another employe of one type of airline may also be classed as a professional. He is the navigator. On airlines across long spans of water, such as the Pan-American "Route to China," navigators are employed. We class them as professionals because of the high standards set up in original selection.

Another semi-professional called for by the aviation industry is the meteorologist, the man who "makes" the weather. These men are generally former employes of the Weather Bureau. However, several colleges are now giving special courses designed to build the college student up to fit this station.

Future Of Aviation Is Bright

What is the future of the air employee? There is no present prospect that any of the trades, businesses or professions which have been described will fade from the air picture. On the other hand, there is every reason to believe that all will continue to offer sure fields of lucrative employment as the industry grows. Aviation employes have one distinct advantage over all others. They are connected with an infant industry. The field does not tend to be over-crowded.

During the great boom days, immediately following 1927, many flocked into aviation looking for thrills and romance or for quick fortunes. Nearly all were dismally disappointed. Flying, like its allied pursuits, is a serious business with normal rewards. But one reward it gives profusely. Its workers must feel the stimulus of the fact that they are intimately connected with a live, growing, rapidly expanding industry. There is nothing dying or decadent about this flying business.

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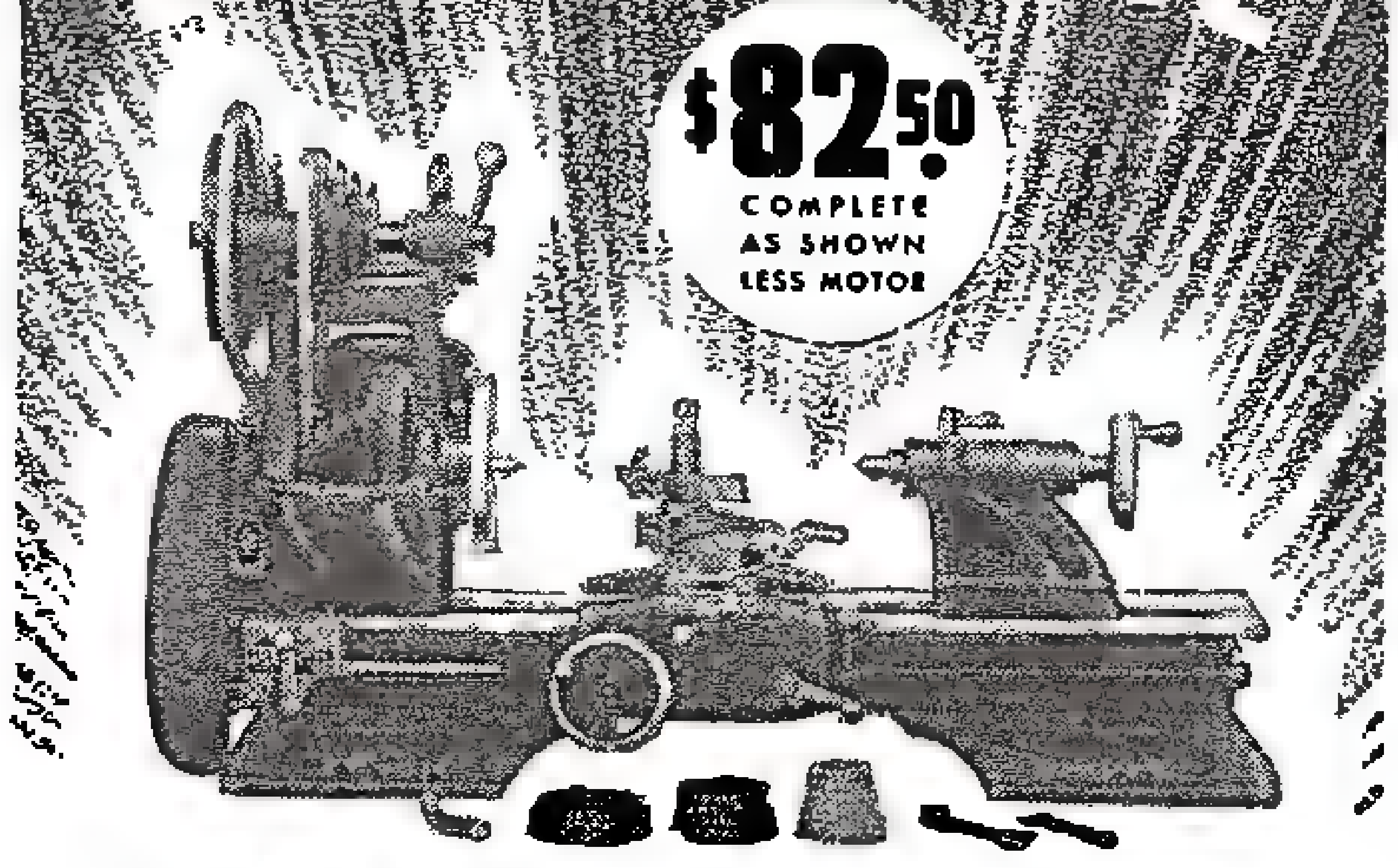
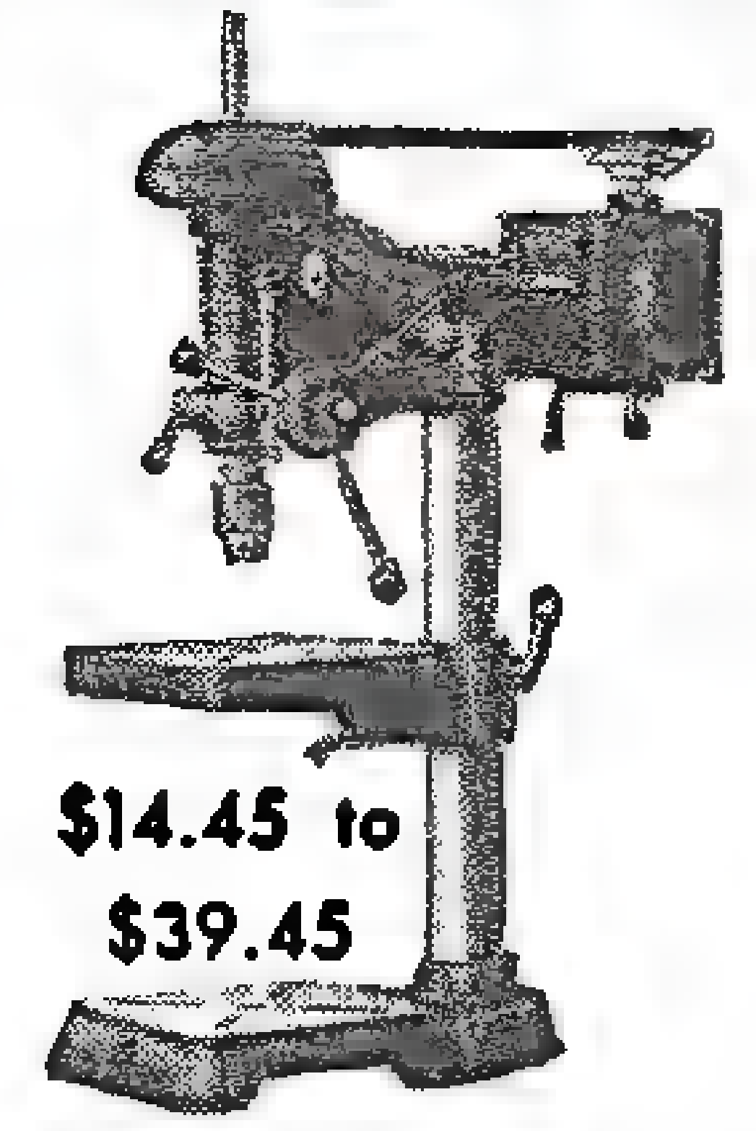


DRILL PRESSES



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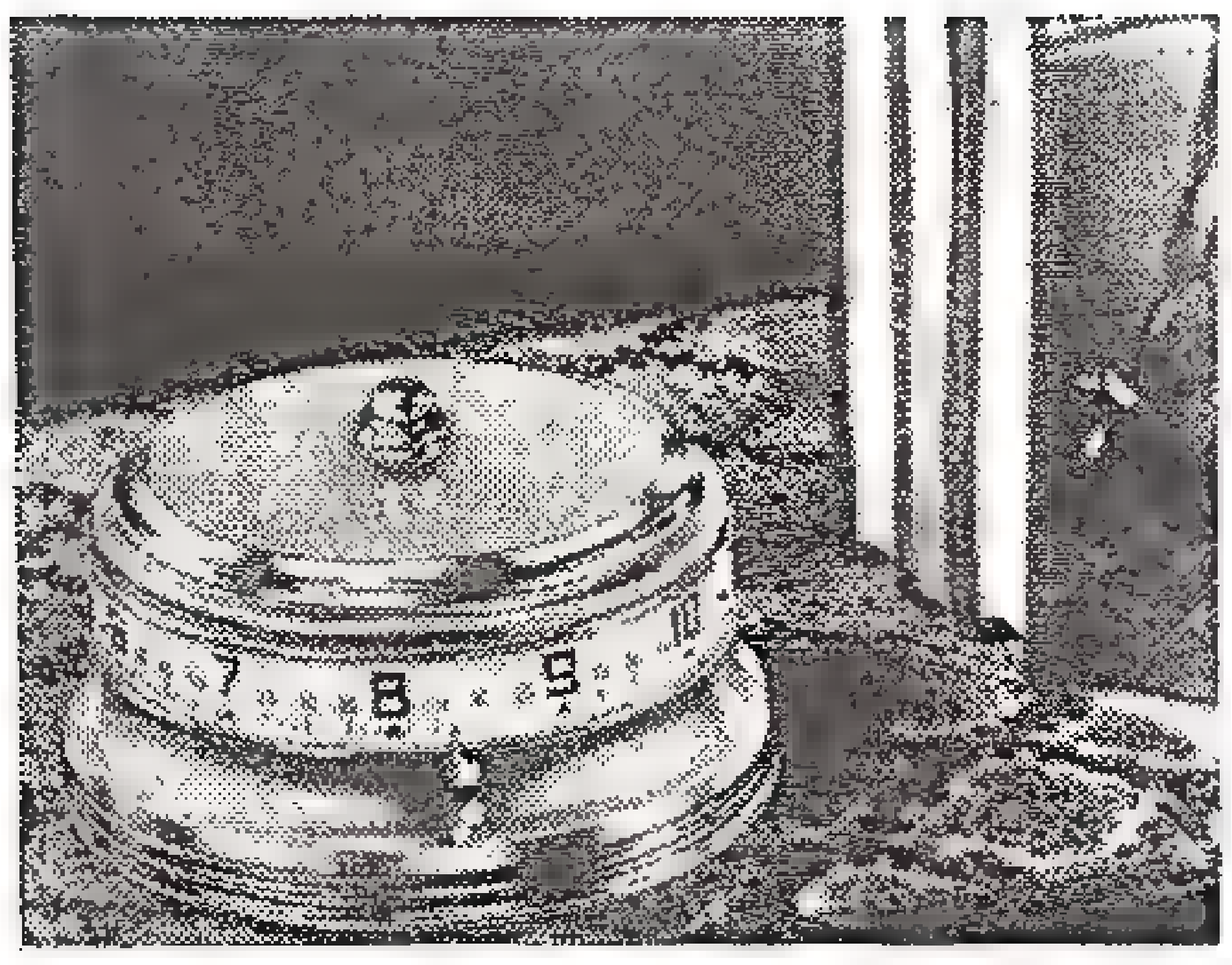
Rotary Clock Gives Time At A Glance



Time at a glance is furnished by a rotary clock having neither hands nor face. The clock bears numerals about its circumference, and as it revolves, time is shown by a stationary indicator.

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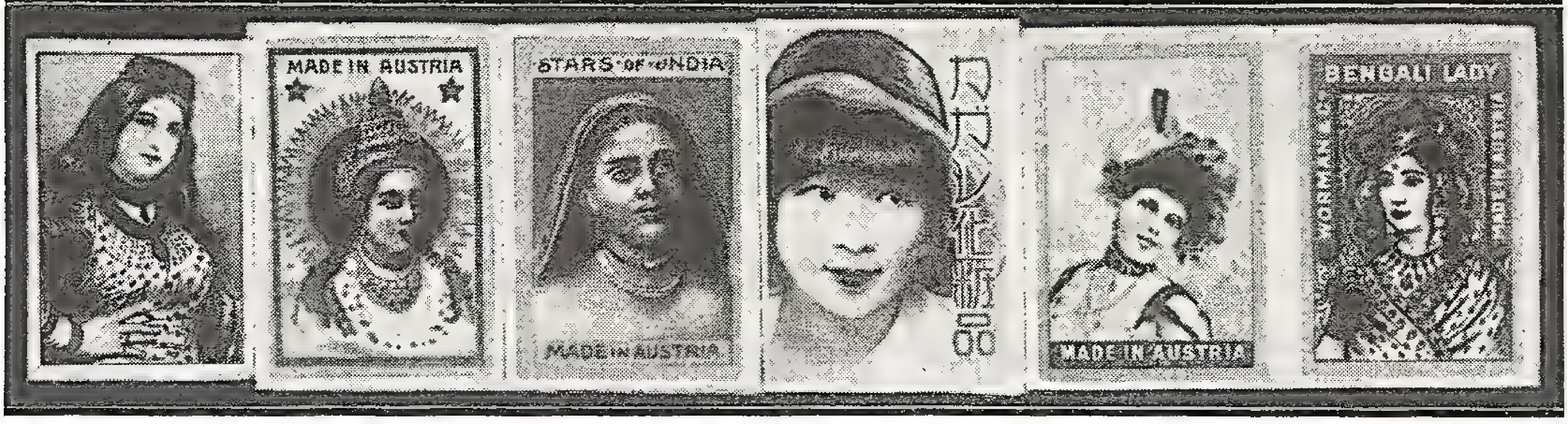

Finding that many of the European safety match boxes were decorated with beautiful color pictures led a German hobby fan to limit his collecting to odd match box labels. In his collection are boxes from nearly every country in the world. A few of the most unusual ones in the form of women's portraits from match boxes from Austria and Japan are shown here.

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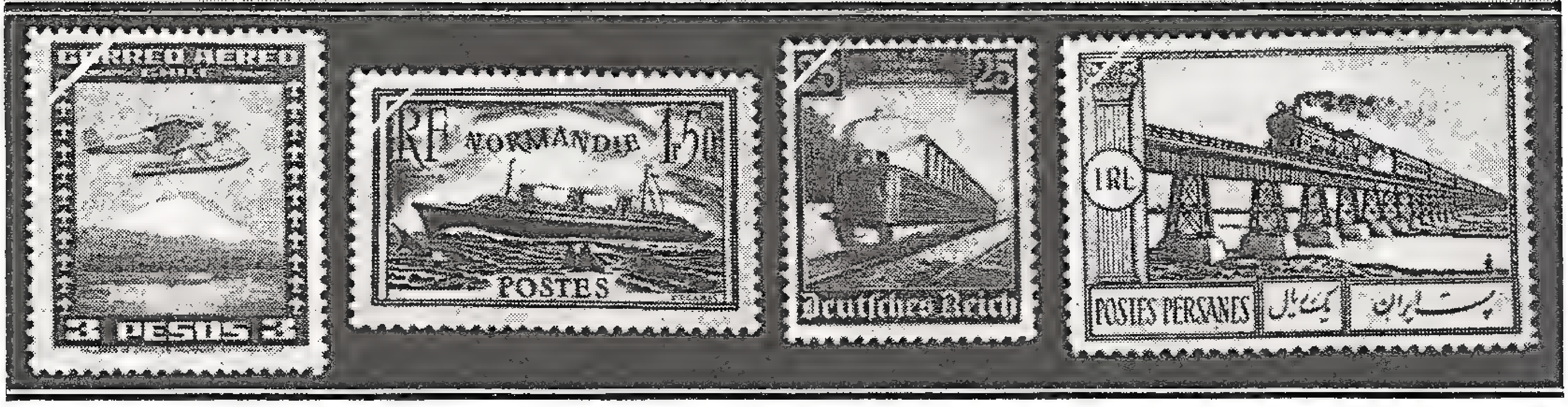
STAMPS SHOW MARCH IN MODERN TRAVEL



All forms of modern travel are depicted in these interesting postage stamps which have been eagerly sought by collectors everywhere. From left to right are the stamps of Chile, showing a modern seaplane; the Normandie stamp, of France; a streamlined train, from a recent German series and Persia's stamp of a European type express train crossing a steel span.

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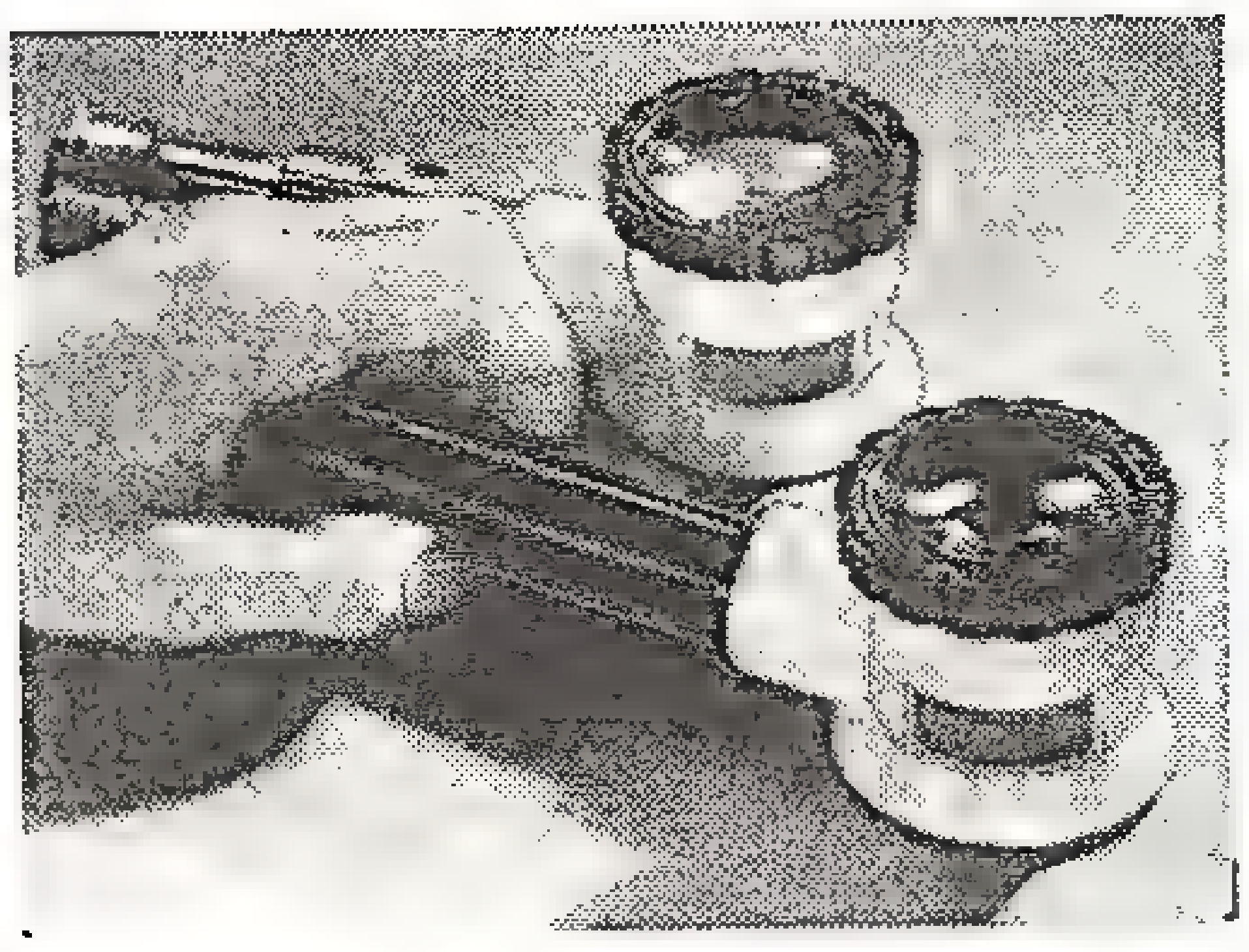

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Found—King Solomon's Mines

[*Continued from page* 43]

surrounded. Ghogoli and his warriors had beaten us to the river! Diressa, our guide, and a panic-stricken one, served as our spokesman, for the murderous sultan was coming up the hill with his mighty retinue. He looked like an apparition, wiry, eagle-eyed, ancient, hook-nosed and evil.

We had built our camp in a semi-circle. Guns in hand, we eight white men and our scant band of about 50 quaking porters prepared to parley.

A Vital Moment

It was a moment that might cost us our lives. Through chattering teeth our interpreter spoke with one of the sultan's men and then told me:

"Ghogoli wants to know what right you have in his country?"

I told Diressa to say: "We are the guests of Haile Selassie, King of Kings."

"Not king of this king! Where are your passports?"

"Coming any minute with Selassie's soldiers from Walya."

"We don't believe you. Either you stay here as my slaves or pay me 1,000 thalers each for ransom!"

The savage sultan's followers were behaving like any bandits would under like conditions, yet it was absolutely necessary that we show no fear in front of these murderous-looking Abyssinians. So we expressed willingness to accompany Ghogoli to his headquarters.

There was a long palaver. The sultan was not satisfied with our reason for invading his sacred territory. He was certain we came for his precious gold and pointed out that always he imprisoned or killed all trespassers.

When we asked the sultan why he was accumulating so much gold dust, the answer was: war clouds and fighting in the East. Gold to buy guns for the British to keep out the Italians.

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And this, mind you, was before the Italo-Ethiopian War began! Yes, here were the ancient mines of the Queen of Sheba being used to help preserve the independence of Abyssinia's far off, savage provinces.

Did we sleep very well that night? Not a wink. As dusk fell, hundreds of savage warriors, behaving like madmen and shrieking a fiendish gibberish which even our interpreter did not understand, paraded all around us. From time to time they waved gruesome trophies, trophies made of shrunken heads.

Suddenly Diressa caught a few familiar

[*Continued on page* 142]

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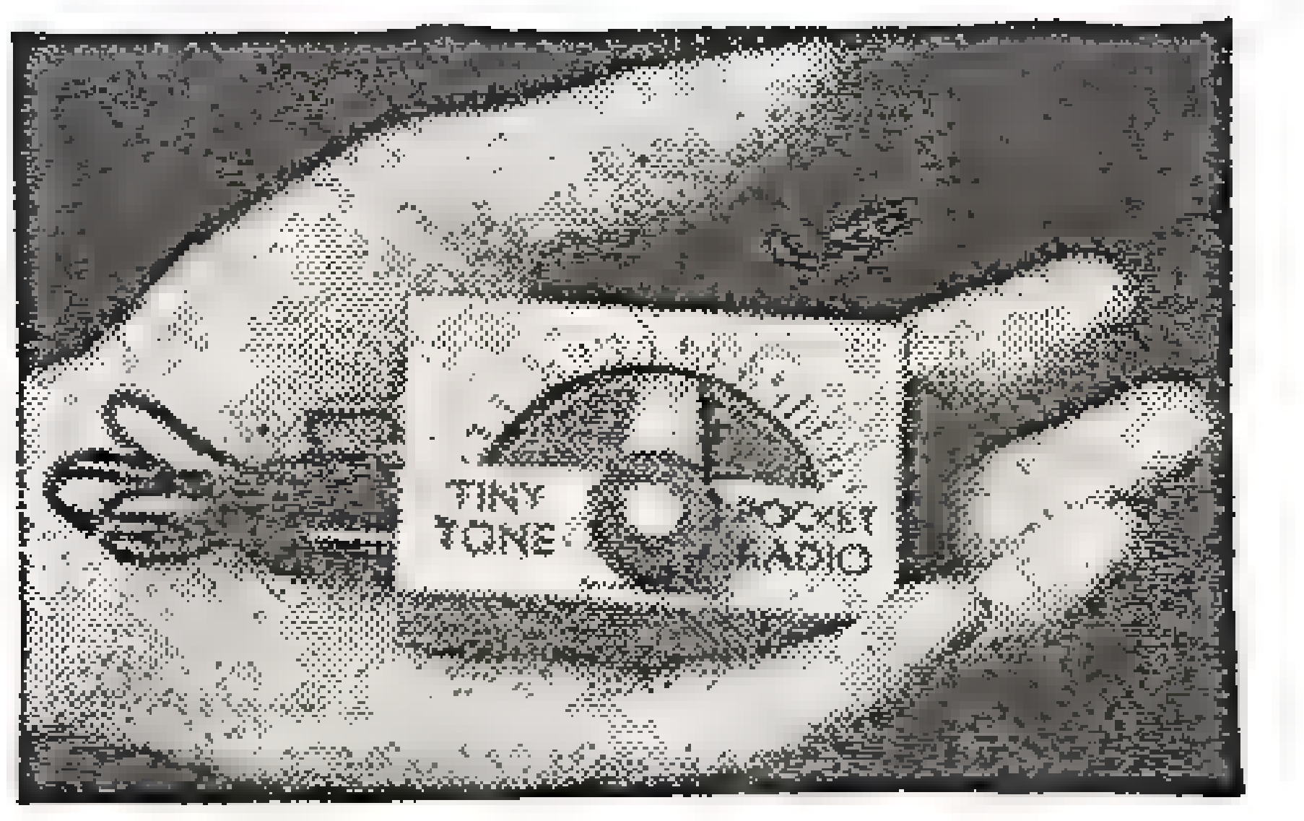

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Found—King Solomon's Mines

[*Continued from page* 141]

phrases and told us that we were camping on the legendary "Execution Hill"! All night the giant tom-toms of the world's most war-like savages boomed in our nerve-wracked and weary ears. Death to the invaders was certain.

Next day Sultan Ghogoli and his oldest son came to gloat over our precarious situation. Our filled money cases and our numerous packages of canned goods and other delicacies made them envious. They handled our modern rifles lovingly. And again Ghogoli repeated his threat of yesterday: "Haile Selassie doesn't know you. You leave all baggage, money and guns here and get back to the British Sudan."

A Miracle Happens

Only a miracle could save us now.

But all was not lost after all. The very next day Ghogoli and company changed their attitude and procedure. Instead of gloating over our unhappy plight, they treated us like kings. Dressed in their grandest finery, they plied us with costly presents.

What had happened? Just this: that same morning one of Selassie's swiftest riders had dashed into the village with the most welcome news of all—that our long-hoped for military escort from Selassie, plus the all-important passports, was only a few miles away.

Yes, the mighty Sultan was a changed man. He was now exceedingly contrite and lavish. He showed us many things no white man had ever seen before: his most valuable golden idols, dating back many centuries, which his slaves had dug up in the surrounding region; also a number of huge, rough diamonds.

We in turn were quite willing to offer presents. And maybe we didn't bless Haile Selassie! His name was indeed powerful in that wild stronghold of barbarism.

Safe At Last

From then on our journey back to Addis Ababa was pleasant and uneventful. Next day, accompanied by the Sultan's tamed, if somewhat sullen warriors, we met Selassie's retinue of 120 warriors on the bank of the Yabus River.

After months of studying the movies and specimens of our exploration trip, I am convinced that this was the legendary land of Ophir of Biblical fame, whence came the gold, frankincense and other treasures for Solomon's celebrated temple in Jerusalem. I also believe that this newly discovered oldest and richest of gold mines is one of the secret, but prime causes of the Italo-Ethiopian war!

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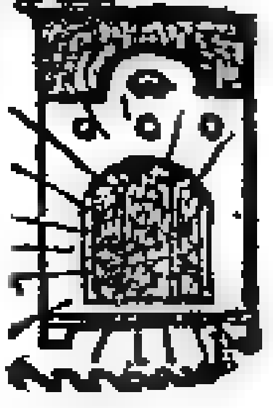

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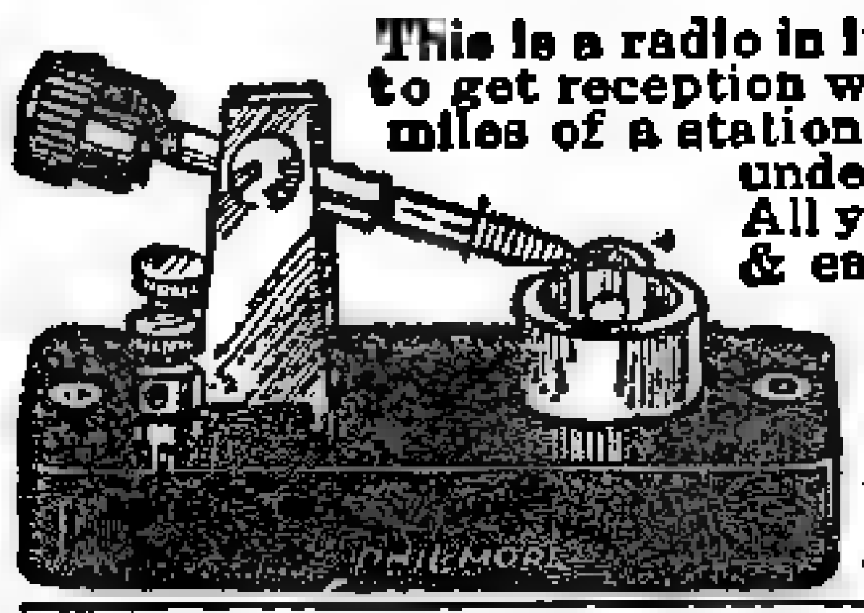

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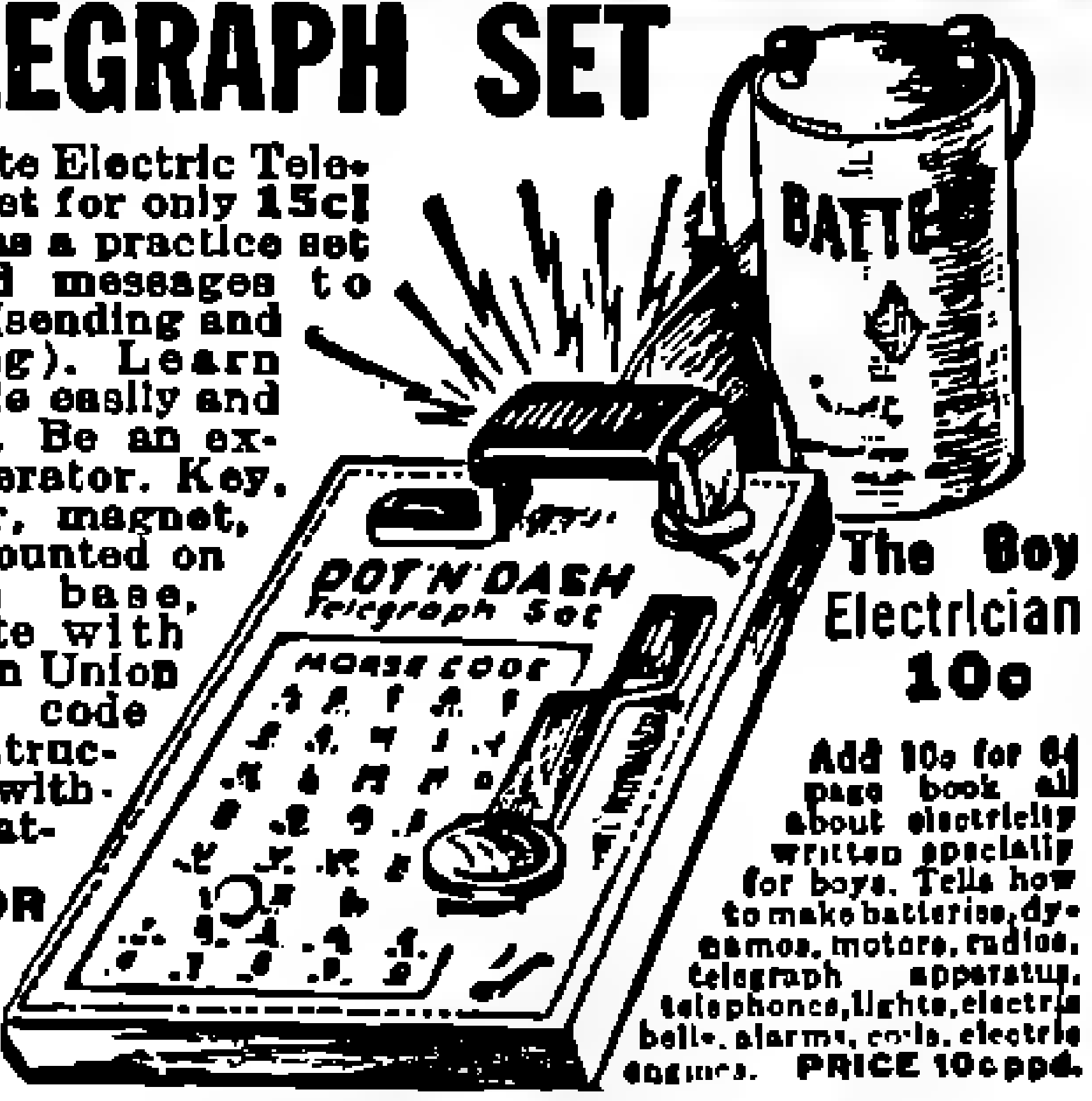
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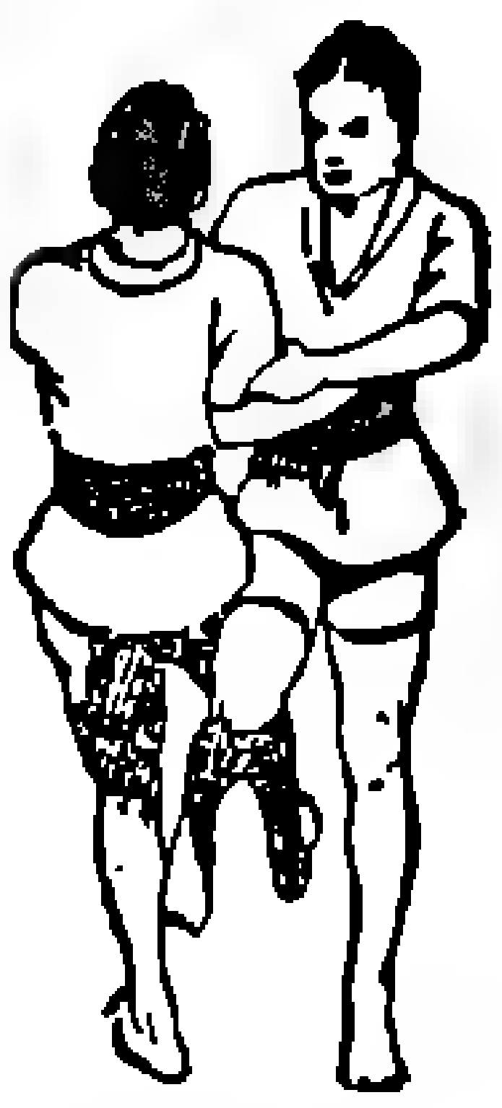

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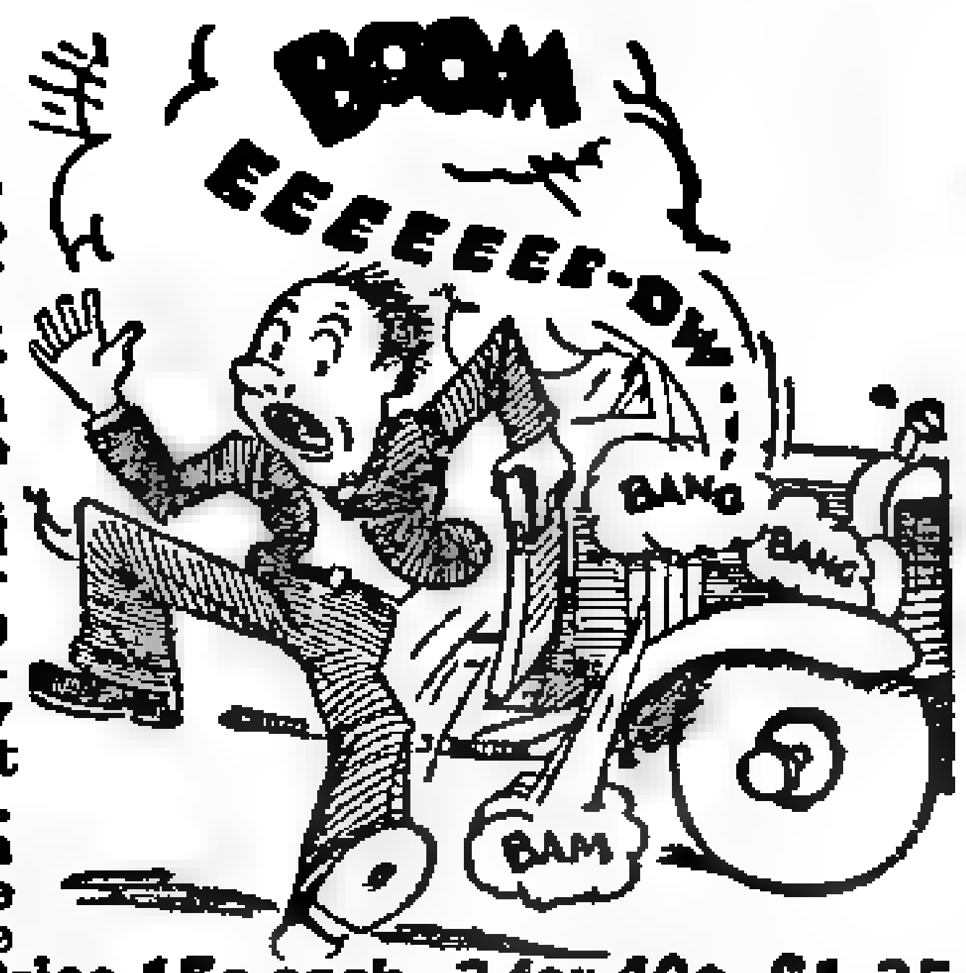

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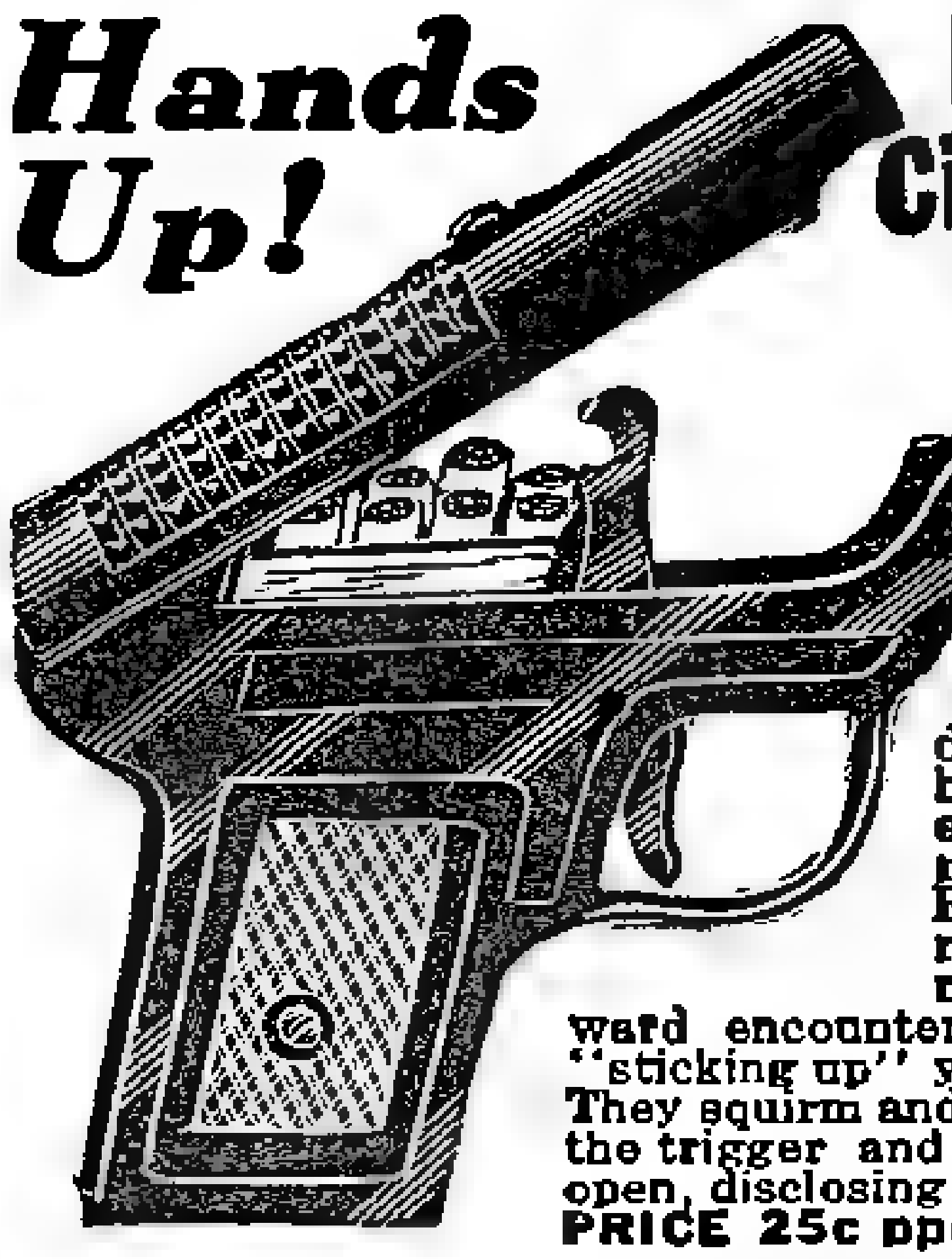

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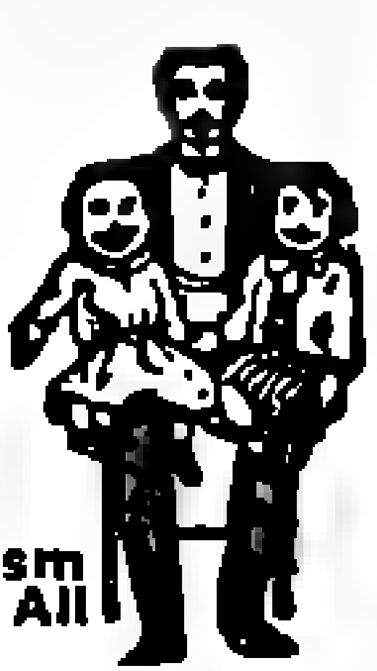
LATEST STEPS. Be popular. Good dancers are always admired--always popular guests. Partners welcome them eagerly. The newest, smartest steps without a teacher. Don't make excuses when the music starts. Get lots of fun from parties and dances. If you want to become a perfect dancer, learn to dance at home this new, easy way. **BOOK TELLS:** How to develop poise and control, improve your dance steps, art of holding, how to walk to music, how to lead, latest Fox Trot steps, Natural and Reverse Turns, the Reverse Wave, the Quickstep, swaying to music, Waltz, Backward Changes, the Continental, the famous Kiss dance, the Manhattan, the College Rhumba, the Carlo, Charleston, and many others. **Art Of Dancing, Price 25 Cents Postpaid.**

BOYS! BOYS! BOYS!

THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends. The



VENTRILO

a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it. **Never fails. A 64 page course on Ventriloquism together with the Ventrilo. All for only 10 cents postpaid.**

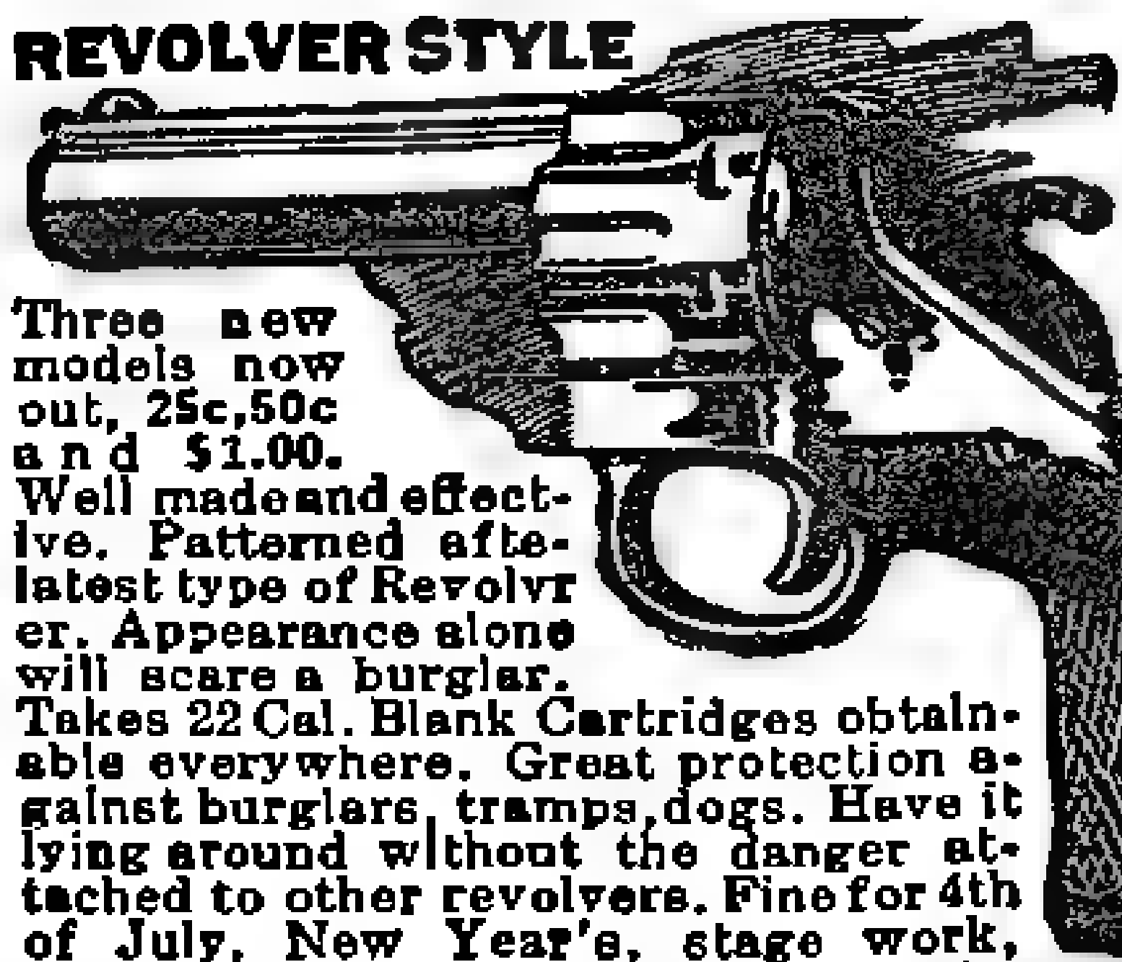
LEARN TO VAMP

PIANO PLAYING MADE EASY

Would you like to play the piano or organ without going through the drudgery of learning the scales and keys and without tedious practice? The **Vamping Tutor** is a greatly simplified method, which, after a little practice, enables you to play the accompaniment to any tune or song written in any "time" or in any "key." No knowledge of music necessary. Once you have mastered the system, you will be able to play the accompaniment to songs, ballads, waltzes, the latest hits, etc., entirely by ear without any music. **Price 12 cents postpaid.**

BLANK CARTRIDGE PISTOL

REVOLVER STYLE

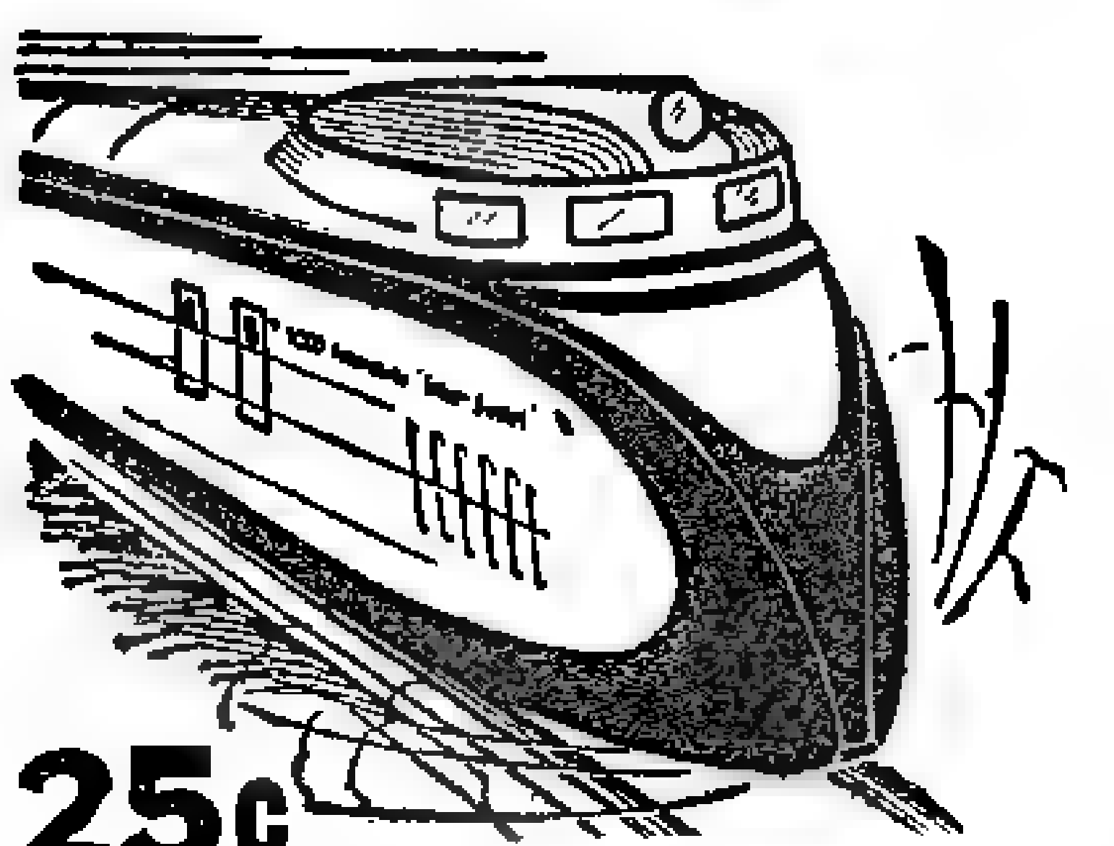


25c
50c
$1.00

Three new models now out, 25c, 50c and $1.00. Well made and effective. Patterned afte latest type of Revolver. Appearance alone will scare a burglar. Takes 22 Cal. Blank Cartridges obtainable everywhere. Great protection against burglars, tramps, dogs. Have it lying around without the danger attached to other revolvers. Fine for 4th of July, New Year's, stage work, starting pistol, etc. **Small size 25c. Medium size 50c. Large size $1.00. Blank cartridges 50c per 100. Holster (cowboy type) 50c. Shipped by Express only, not prepaid.**

Our Christmas Special!

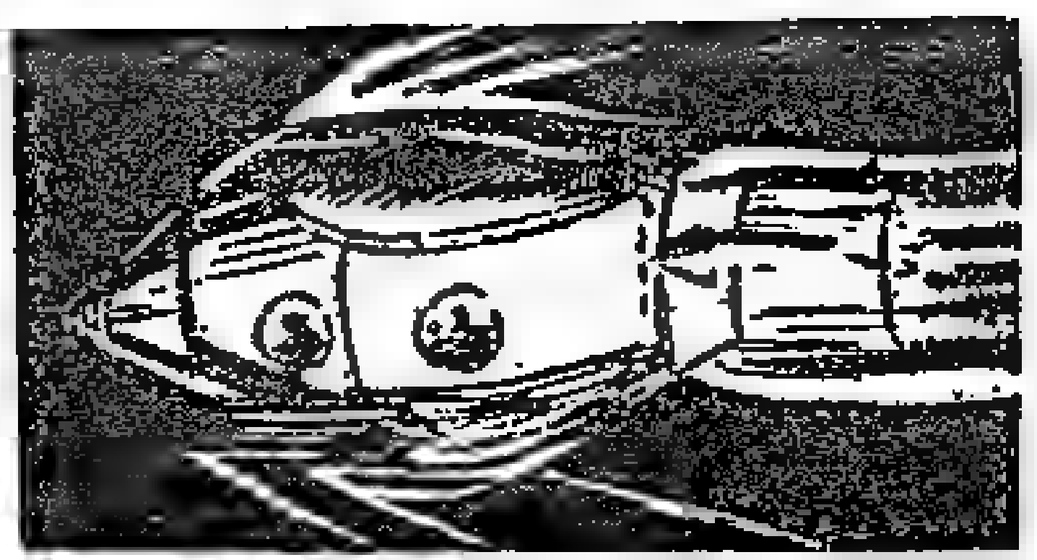
Electric Train Kit



25c

An Electric Train for **25c!** Completely assembled in a few minutes. Train is beautifully lithographed in several colors. Fast, it goes faster than most large trains. Needs no tracks or transformers—a big savings. Runs on dry cells, indoors or outdoors. Get **two** or **three** of them — they make snappy Xmas presents. **Price, complete 25c, plus 10c postage and packing.**

ROCKET SHIPS!



Step into the future with a Rocket Ship of your own! **Buck Rogers and Flash Gordon** use them. Be centuries ahead of anybody in your neighborhood. Several kinds: rocket planes, rocket cars or rocket boats. Complete plans are in book form. Rockets require only about an hour to build from inexpensive materials obtainable at your druggist or chemical supply company. Will go far at high speeds! **Price 10c postpaid.**

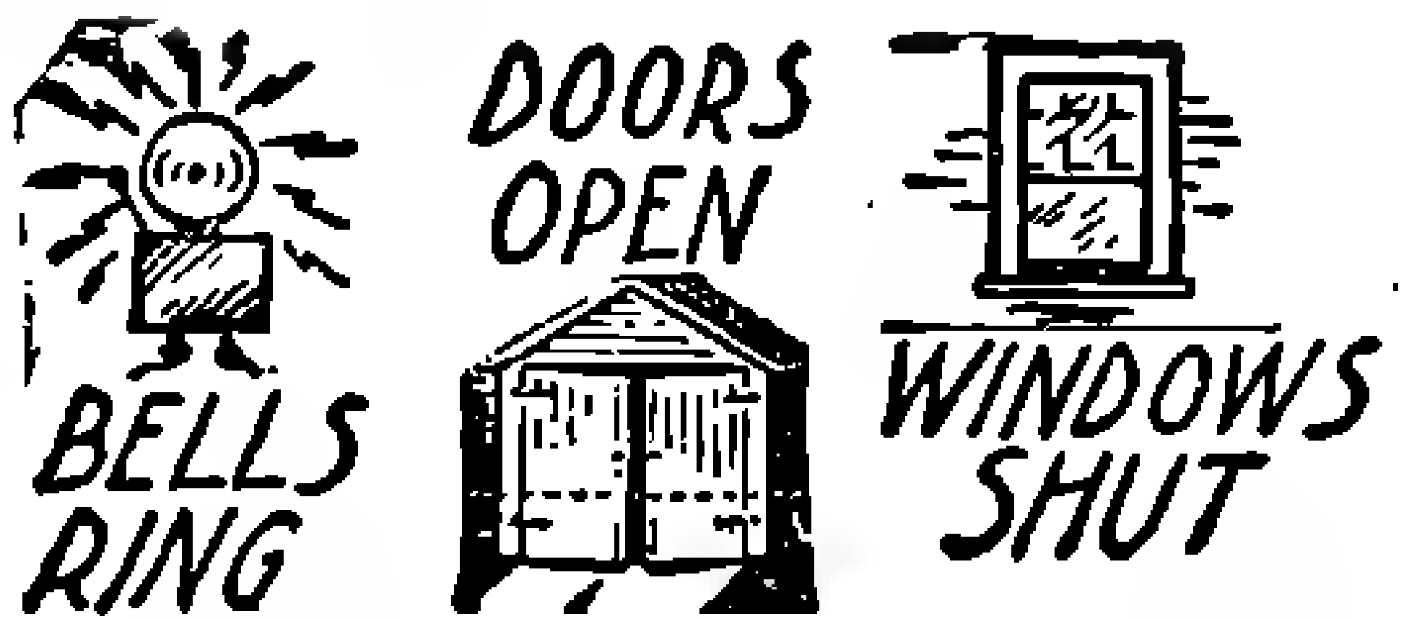
HOW TO TAP DANCE

PRICE 25c

Why envy the easy rhythm and fascinating grace of Step'n Fetchit, Fred Astaire etc. Tap dance in ONLY 6 HOURS by a new, simplified course by Prof. Wilson. No special ability needed. Be smart! Everybody's tapping. The whole town is tapping. Beat out a tune with your feet. Hostesses love it. Friends adore it. Besides, tap dancing is not only invigorating and entertaining but is also health-giving exercise for making the limbs supple and giving a "springy" feeling of fitness to the whole body. Promotes slimness nature's way, without pills, drugs or dieting. Readers say: ". . . wonderful benefit. Thank you for adding tap dancing to my accomplishments." **PRICE 25 CENTS POSTPAID.**

ELECTRIC EYE 25c

PHOTO-ELECTRIC CELL

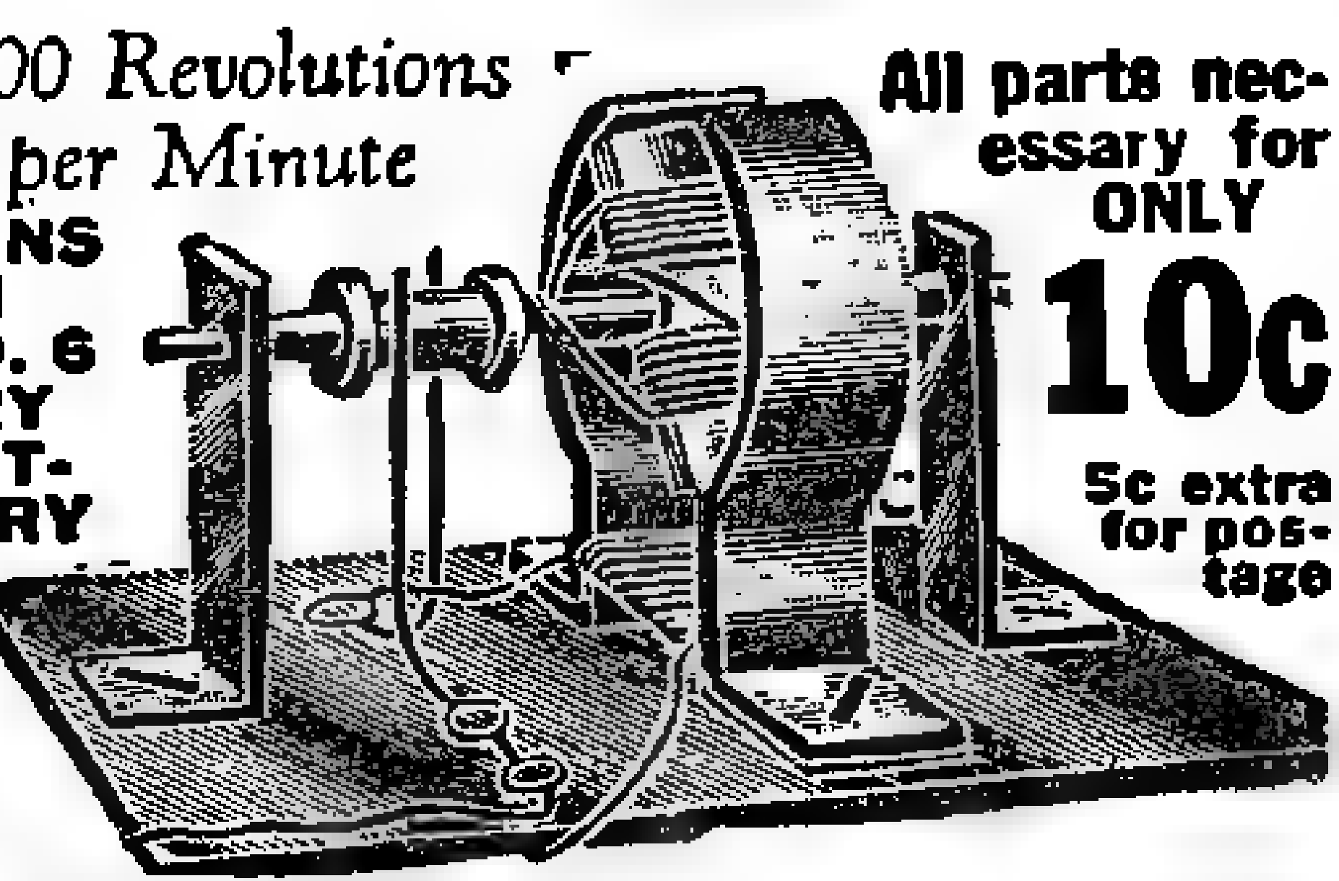


The **Electric Eye**--Photocell--is one of the latest scientific discoveries that has many practical uses. A flash of light opens a garage, window, door, turns lights on or off, stops or starts a motor, etc. Used in all television sets. The miracle with a million uses! No experimentor, no inventor (and who isn't?) should be without this latest scientific novelty. Can also be used to amuse and delight people by creating weird effects. Lights go off, doors bang, with a flash of light. **Electric Eye, only 25c postpaid. Supersensitive Electric Eye, better quality, 50 cents postpaid.**

ELECTRIC MOTOR

6000 Revolutions per Minute

RUNS ON NO. 6 DRY BATTERY

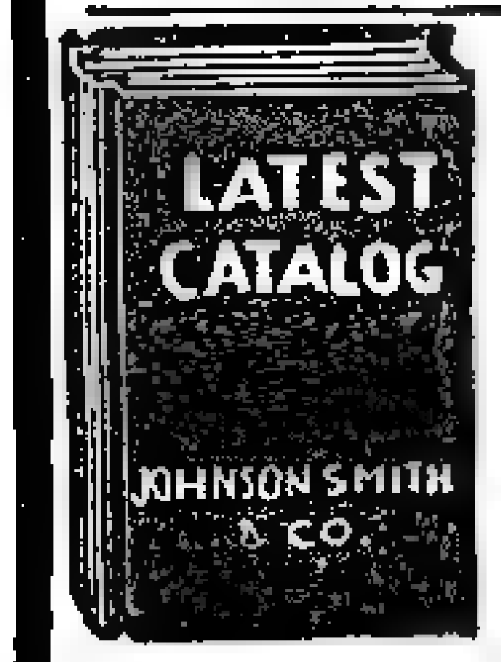


All parts necessary for ONLY

10c

5c extra for postage

An Electric Motor for 10c. Sounds almost unbelievable but it is perfectly true. We send all th parts packed in a neat box, with full instructions for assembling. No trouble at all putting it together--it is FUN. Takes but a few minutes. And OH BOY! Isn't it speedy! Runs on a No. 6 or similar dry battery. You can learn more about a motor in 30 minutes than by hours of study. Perform many novel and interesting experiments with it. **Price 10c; postage 5c extra.**

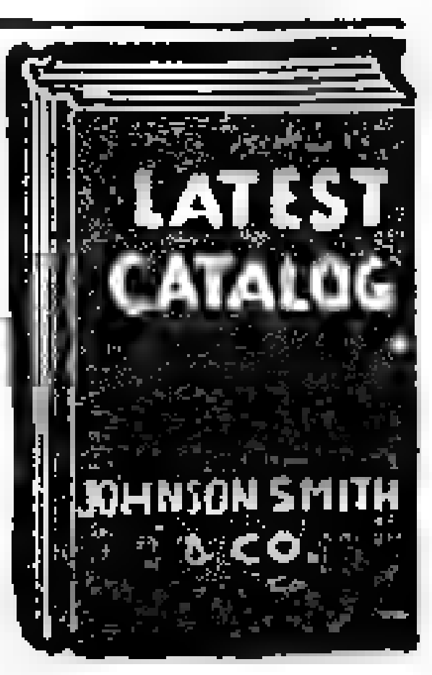


ADDRESS ALL ORDERS FOR GOODS ON THIS PAGE TO

JOHNSON SMITH & CO.

Dept. 540, 6615 E. Jefferson Ave., DETROIT, MICH.

A copy of our NEW CATALOG mailed on receipt of 10c, or the De-Luxe Edition with cloth binding 25c. Bigger and better than ever. Only book of its kind in existence. Nearly 600 pages of the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., unprocurable elsewhere. *Stamps Accepted.*



Everything in RADIO

Send for the latest ALLIED Radio Catalog. New Metal Tube radios—battery, 32 Volt, 6 Volt and Auto Sets; dozens of new Set-Builders Kits; everything in Short Wave Receiving and Transmitting Equipment; new Public Address Amplifiers and Systems; also thousands of exact duplicate and replacement parts, radio books, tools and latest test equipment.

Allied Radio

Free "BUILD YOUR OWN"

Write to us for FREE parts lists for building popular circuits such as Hitch-Hiker's 2-Tube Portable; 2-Tube All-Wave All-Electric; 6-Tube Auto Set; Table Lamp Radio; Vest Pocket Receiver; Musical Derby; 2-in-1 Amplifier, Midget P.A. System, etc. We can supply matched kits for building any Modern Mechanix circuit. Write for our FREE parts lists.

ALLIED RADIO

833 W. Jackson Blvd. Dept. B.
Chicago, Illinois.

☐ Send me your FREE Radio Catalog.

☐ Send me Parts List for ....

Name ....

Address ....

SHE'LL SAY "THANKS"
and You'll Make Up to
$5 A DAY or 500% Profit
AUTOMATIC GAS LIGHTER

Packed on individual cards. Samples 10c. Retail 25c. Rush $1 for dozen or $8 for 15 dozen. We pay PP charges.
New Method Mfg. Co. Box MG-43, Bradford, Pa.

Two Giant Industries NEED MEN NOW!

AIR CONDITIONING
ELECTRIC REFRIGERATION

We supply trained men for America's two fastest-growing industries. If you can meet our requirements, we will train you for good pay positions as Installation and Service Expert in the Electric Refrigeration and Air Conditioning fields. We will give you an opportunity to qualify for profitable employment with an exceptionally bright future.

Can You Qualify?

To be acceptable for enrollment you should be mechanically inclined, between ages of 18 and 40, have fair education and be able to furnish character references.

FREE BOOK

Get amazing facts about actual opportunities for ambitious men in Air Conditioning and Electric Refrigeration. Our new Free Book describes these money-making opportunities and tells how you can qualify if you meet our requirements. Write for your copy today stating which industry interests you most. No obligation.

UTILITIES ENGINEERING INSTITUTE Established 1927
400-410 N. Wells St., Dept. 276, Chicago, Ill.

Daredevil Dub—Menace of Racing

[*Continued from page* 66]

again and gone on their way. Then along came the dub. He suddenly saw the human heap lined up in front of his radiator and, without thinking, he spun into a skid and slammed backwards into the pits just below, mangling the pit attendants. Yet, when it was all over, he was acclaimed a hero by the spectators. Fast thinking and experience with similar accidents would have staved off the disaster that cost two of the pit attendants their lives, for the unconscious pilot, apparently dead there on the track, was merely out cold and just a little bruised.

For the foregoing reasons, and many others, the "dub" is the terror of all veteran pilots. There is no telling what he will do when a mechanical break starts the cars piling up.

Talk with any one of the veteran Indianapolis Speedway pilots, and he will tell you of the "good old days" when rivals rode wheel to wheel and fought each other in the turns with not an inch to spare between them. Those mechanical jockeys eased long engine strains by getting a tow—riding the suction created by the tail of the hurtling car ahead, with radiator of the car behind seemingly coupled right on to the other fellow's tail. That took head work and complete confidence that the other fellow wouldn't let them down. And he never did.

England's Wonder Giant Puts to Sea

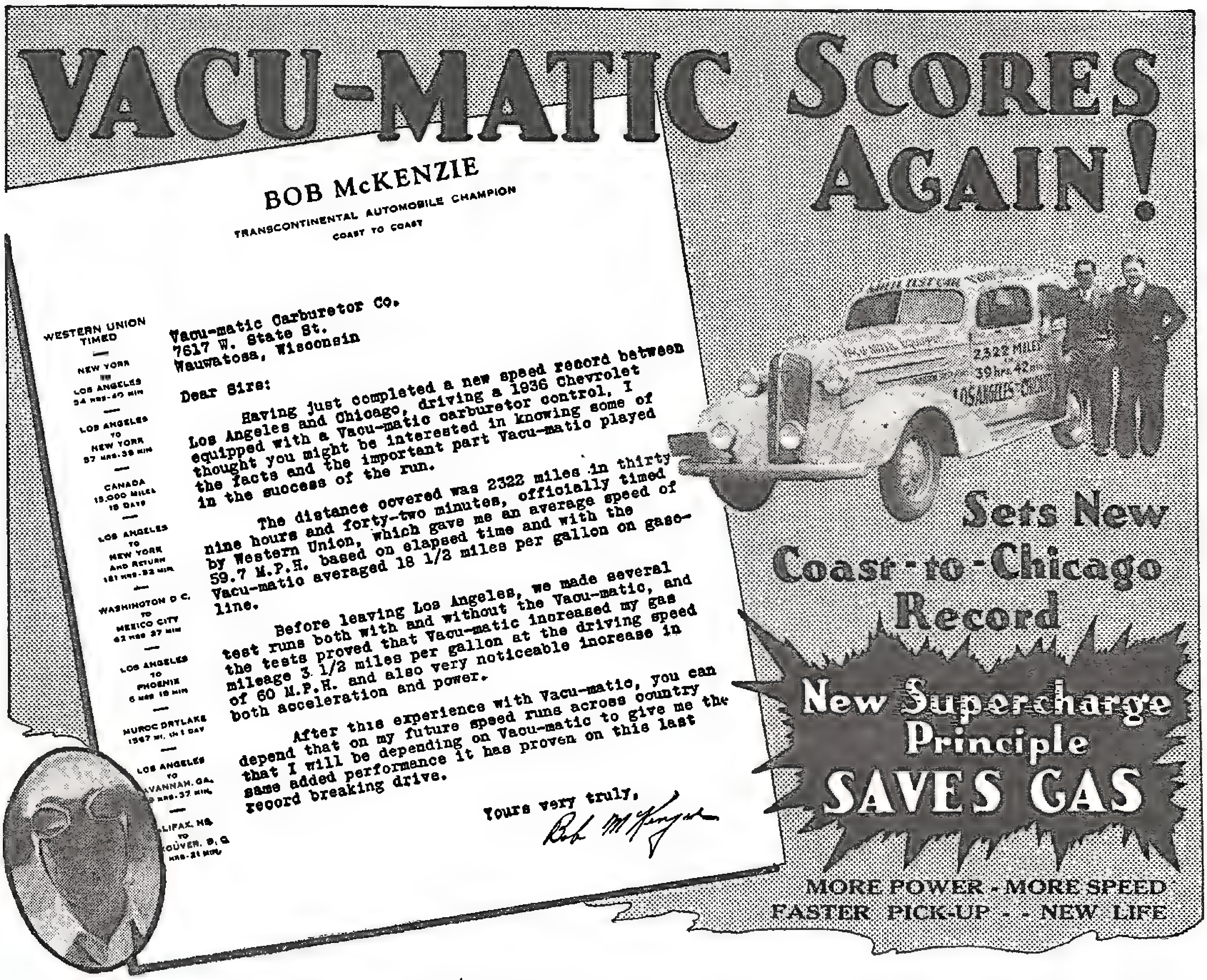
[*Continued from page* 48]

and longtitude of the voyage can be determined at will.

Up on the bridge are twin steering wheels, geared to dual controls. If one wheel goes dead, the change over to the other is only a matter of seconds. In the diagram on page 48 is shown how the puny power of one man is increased stage by stage until the gigantic rams turn the 140-ton rudder. The rudder has two doors so that the repair crew can enter and make repairs from inside when necessary. "Iron Mike" does most of the sea steering, for this gyro-pilot not only keeps the ship on her course, but makes a permanent record of every course steered.

It required a quarter of a million craftsmen to provide material for and construct this great ship. Her decorations alone total $2,500,000.00 in cost. Mail is handled by electric hoists and chutes.

And when occasion calls, it will be possible for the *Queen Mary* to arrive in port, disembark passengers, restore, refuel, embark passengers and proceed on her next voyage inside of 12 hours. This vast floating hotel is indeed a wonderful ship.


VACU-MATIC SCORES AGAIN!
2322 MILES
39 HRS. 42 MIN.
LOS ANGELES-CHICAGO
Sets New Coast-to-Chicago Record
New Supercharge Principle
SAVES GAS
MORE POWER - MORE SPEED
FASTER PICK-UP - - NEW LIFE

BOB McKENZIE
TRANSCONTINENTAL AUTOMOBILE CHAMPION
COAST TO COAST

WESTERN UNION TIMED
NEW YORK TO LOS ANGELES 54 HRS-40 MIN
LOS ANGELES TO NEW YORK 57 HRS-38 MIN
CANADA 15,000 MILES 15 DAYS
LOS ANGELES TO NEW YORK AND RETURN 181 HRS-52 MIN
WASHINGTON D.C. TO MEXICO CITY 62 HRS 27 MIN
LOS ANGELES TO PHOENIX 6 HRS 18 MIN
MUROC DRYLAKE 1967 MI. IN 1 DAY
LOS ANGELES TO VANNAH, GA. HRS-37 MIN
LIFAX, NS. TO COUVER, B.C. HRS-21 MIN

Vacu-matic Carburetor Co.
7617 W. State St.
Wauwatosa, Wisconsin

Dear Sirs:

Having just completed a new speed record between Los Angeles and Chicago, driving a 1936 Chevrolet equipped with a Vacu-matic carburetor control, I thought you might be interested in knowing some of the facts and the important part Vacu-matic played in the success of the run.

The distance covered was 2322 miles in thirty nine hours and forty-two minutes, officially timed by Western Union, which gave me an average speed of 59.7 M.P.H. based on elapsed time and with the Vacu-matic averaged 18 1/2 miles per gallon on gasoline.

Before leaving Los Angeles, we made several test runs both with and without the Vacu-matic, and the tests proved that Vacu-matic increased my gas mileage 3 1/2 miles per gallon at the driving speed of 60 M.P.H. and also very noticeable increase in both acceleration and power.

After this experience with Vacu-matic, you can depend that on my future speed runs across country that I will be depending on Vacu-matic to give me the same added performance it has proven on this last record breaking drive.

Yours very truly,
Bob McKenzie

ESTABLISHING new mileage records on cars in all sections of the country, the Vacu-matic again scores in a new speed record established by Bob McKenzie transcontinental automobile champion. Los Angeles to Chicago — 2,322 miles in 39 hours and 42 minutes— driving 75 and 80 to maintain a speed average of 59.7 miles per hour!

Here is speed—a gruelling grind—where quick accelaration, greater top speed — and less stops for gasoline mean those precious moments saved that make new speed records possible

The same Vacu-matic that helped Bob McKenzie establish this speed record and gave him such fine gas savings is now available for all car owners. It is positively automatic—simple to install—inexpensive—and pays for itself many times over in gas savings

Automatic • • Nothing Like It!

Vacu-matic is *entirely different!* It operates on the supercharge principle by automatically adding a charge of extra oxygen, drawn free from the outer air, into the heart of the gas mixture. It is entirely AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. It is so simple it will amaze you—so practical it will save you many dollars on gas costs.

Agents and Salesmen

VACU-MATIC offers a splendid opportunity for unusual sales and profits. Valuable territories now being assigned. Check and mail coupon.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and fused into one unit, correctly adjusted and *sealed at the factory*. Nothing to regulate. Easily attached in ten minutes.

The VACU-MATIC Co. **Wauwatosa, Wis.**

Guaranteed Gas Savings

VACU-MATIC must prove itself on every car. It is guaranteed to give worthwhile gas savings, quicker pick-up and more power, or it costs you nothing. "On my V-8 Ford it works miracles", says Ralph Fields. James Seeley —"On an International Truck on a round trip to Cleveland, 385 miles, it saved 19 gallons of gas." A. V. Grove —"On the Buick it showed 5 miles more per gallon." F. S. Peck—"I average 22 miles per gal. on my Plymouth, an increase of 7 miles, for a saving of $15.00 a month, or $180.00 a year." Wm. Lyons—"Averaged 25 miles on a gal. with a Model A Ford at 40 miles per hour."

Free Details

You owe it to yourself to know all about this remarkable discovery. Mail the coupon below. Start saving gas with VACU-MATIC and enjoy a new driving thrill! There's no obligation—so get the facts now! Write today!

FREE OFFER COUPON

THE VACU-MATIC COMPANY
7617-207 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

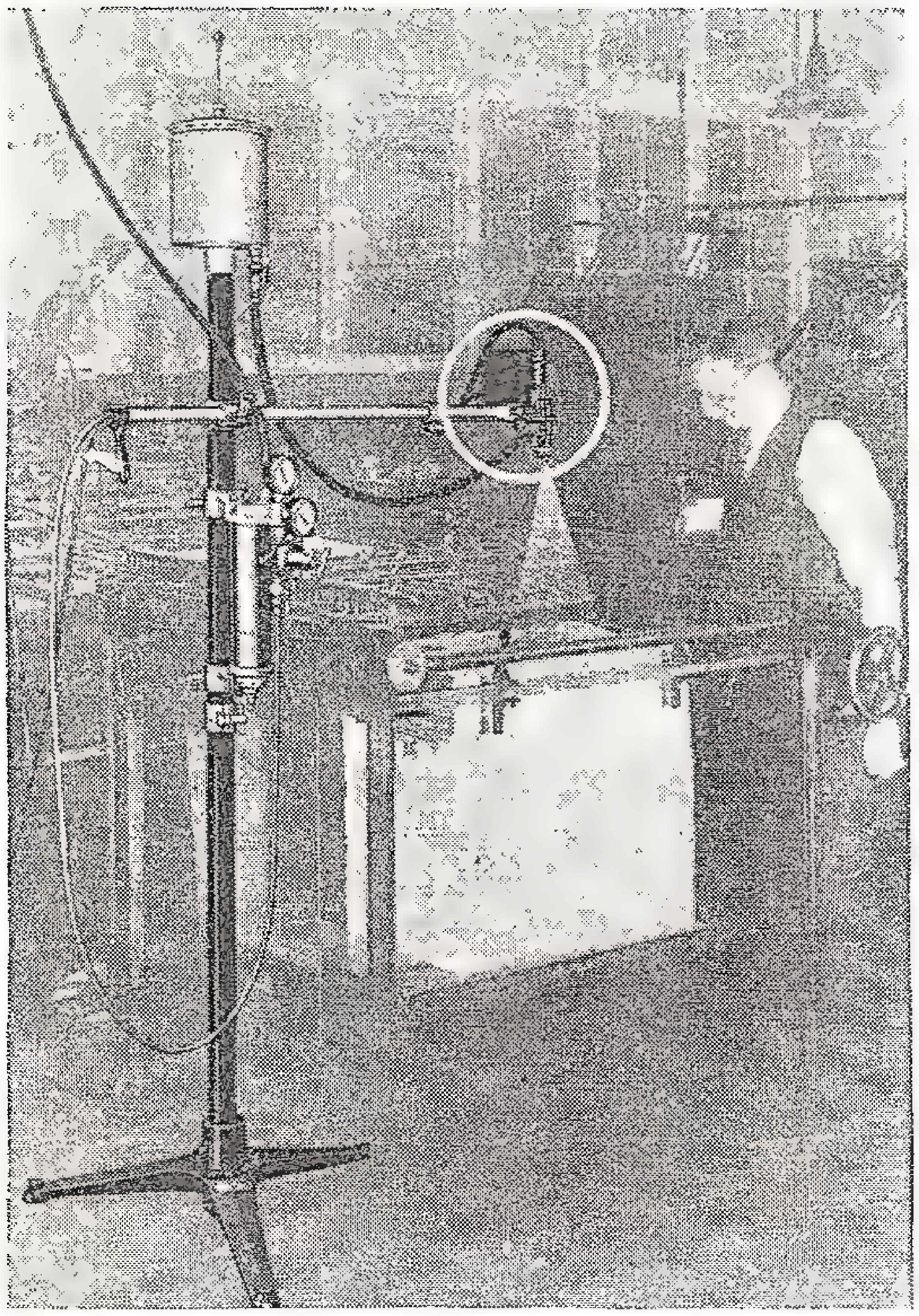
Name ....

Address ....

City .... State..............

☐ Check here if interested in selling proposition.

New Ideas that Boost Business

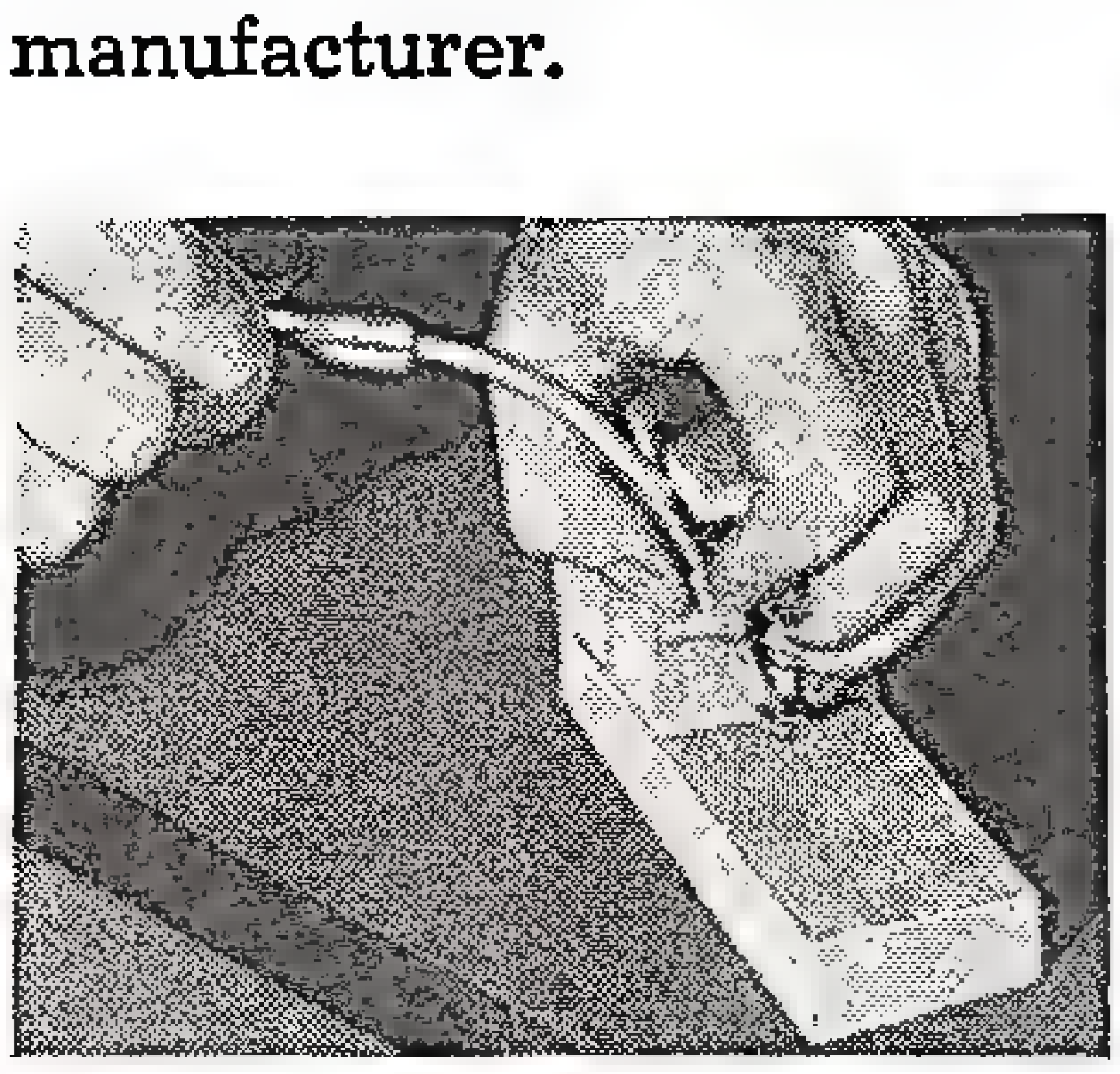


This spraying device, designed for the printing trade, deposits a thin film of powder over each sheet as it leaves the press. The powder absorbs the fresh ink, preventing smudging and offsetting. No absorbent paper inserts are needed.

A man's wrist watch combines the features of stop watch, telemeter and tachometer in a single, compact unit.

A reflector belt for pedestrians is studded with reflector buttons for safety at night.

A light plane containing many improvements has recently been announced by a Pittsburgh manufacturer.

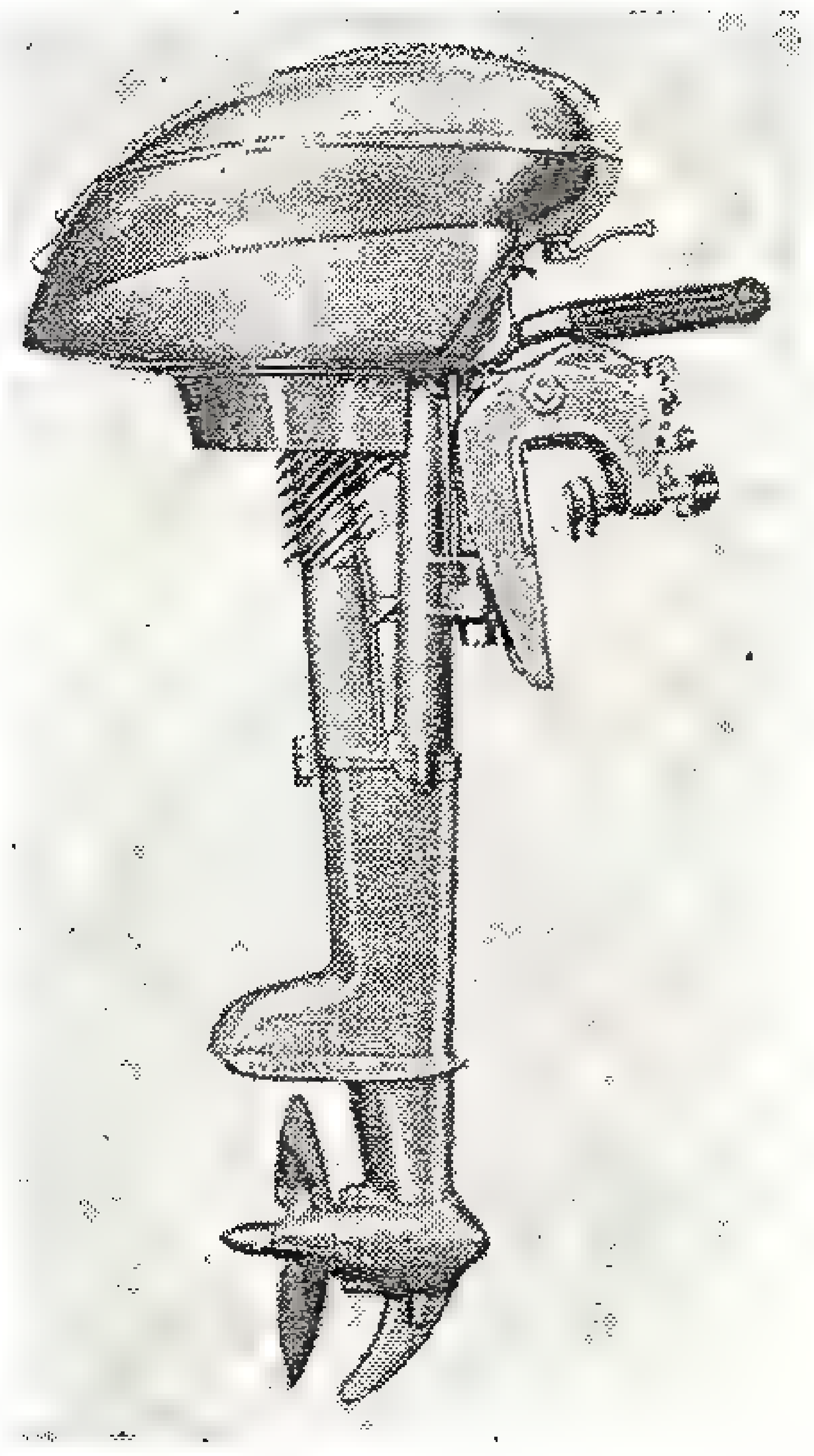


A working angle of more than 90 degrees is obtained by this screw driver which works around corners.

A latch-string envelope is opened and contents removed by pulling a string.

A cigarette dispenser for cars releases a lighted cigarette when button is pressed.

A depth gauge for printers quickly determines the depth of halftone plates.



Aircooled is this light-weight outboard motor. It weighs 22½ pounds and develops 2 horsepower.

Spark plugs with a U type shell electrode are now being made. Greater spark area and less carbon are claimed for it.

An eight-inch floor sander with adjustable drum insures fast work and a greater saving in sand paper.

An exercising machine mechanically duplicates the benefits of rowing, swimming, bicycling and horseback riding.

A hanger rod for bathroom, kitchen, closet, or automobile can be adjusted to any length. No screws are needed, the rod expanding or contracting at the twist of an internal screw.

A mosquito repellant in the form of a cream is greaseless, stainless, and pleasantly fragrant. It also repels other insects.

A radio receiver features a new tuning dial containing all wave bands on the single face. Coverage from 540 to 18,000 kilocycles is possible.

A fly killer electrically vaporizes a new chemical formula which penetrates all corners of the room. The odor is unnoticeable.

An air cleaner designed for cars in the dust storm area is reported to have conquered dust trouble as far as motors are concerned.

Rubber sealed reflector buttons withstand the abuse of traffic and are not dimmed by moisture.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending a stamped, self-addressed envelope to Modern Mechanix Publishing Co., *Information Bureau, Fawcett Building, Greenwich, Connecticut. Manufacturers are invited to submit material.*

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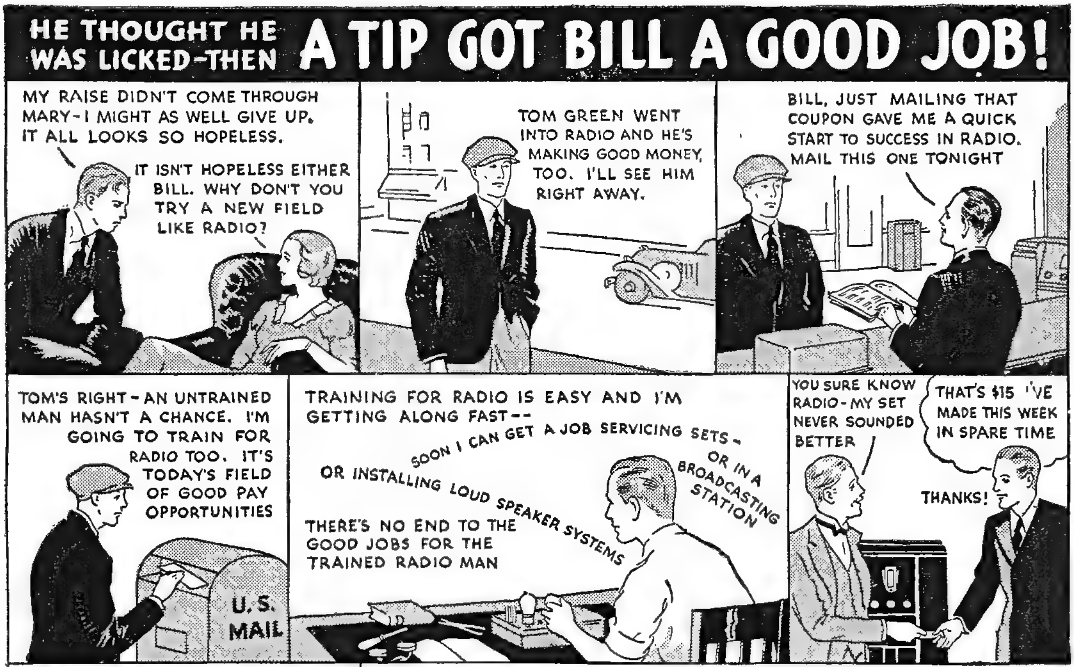

HE THOUGHT HE WAS LICKED—THEN A TIP GOT BILL A GOOD JOB!
MY RAISE DIDN'T COME THROUGH MARY—I MIGHT AS WELL GIVE UP. IT ALL LOOKS SO HOPELESS.
IT ISN'T HOPELESS EITHER BILL. WHY DON'T YOU TRY A NEW FIELD LIKE RADIO?
TOM GREEN WENT INTO RADIO AND HE'S MAKING GOOD MONEY, TOO. I'LL SEE HIM RIGHT AWAY.
BILL, JUST MAILING THAT COUPON GAVE ME A QUICK START TO SUCCESS IN RADIO. MAIL THIS ONE TONIGHT
TOM'S RIGHT—AN UNTRAINED MAN HASN'T A CHANCE. I'M GOING TO TRAIN FOR RADIO TOO. IT'S TODAY'S FIELD OF GOOD PAY OPPORTUNITIES
U. S. MAIL
TRAINING FOR RADIO IS EASY AND I'M GETTING ALONG FAST--
SOON I CAN GET A JOB SERVICING SETS—OR IN A BROADCASTING STATION
OR INSTALLING LOUD SPEAKER SYSTEMS
THERE'S NO END TO THE GOOD JOBS FOR THE TRAINED RADIO MAN
YOU SURE KNOW RADIO—MY SET NEVER SOUNDED BETTER
THAT'S $15 I'VE MADE THIS WEEK IN SPARE TIME
THANKS!

N.R.I. TRAINING CERTAINLY PAYS. OUR MONEY WORRIES ARE OVER AND WE'VE A BRIGHT FUTURE AHEAD IN RADIO.
OH BILL, IT'S WONDERFUL YOU'VE GONE AHEAD SO FAST IN RADIO.

I'LL TRAIN YOU AT HOME *In Your Spare Time For A* GOOD RADIO JOB

MAIL THE COUPON NOW. Get the facts about Radio—the field with a future. N. R. I. Training fits you for jobs in connection with the manufacture, sale and operation of Radio equipment. It fits you to go in business for yourself, service sets, operate on board ships, in broadcasting, television, aviation, police Radio and many other opportunities. My FREE book tells how I train you quickly at home in spare time to be a Radio Expert.

Many Radio Experts Make $30, $50, $75 a Week

Why struggle along in a dull job with low pay and no future? Start training now for the live-wire Radio field. I have helped many men make more money. Hundreds of successful men now in Radio got their start through N. R. I. Training.

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

Hold your job. I'll not only train you in a few hours of your spare time a week, but the day you enroll I start sending you Extra Money Job Sheets which quickly show you how to do Radio repair jobs common in most every neighborhood. I give you Radio Equipment for conducting experiments and making tests that teach you to build and service practically every type of receiving set made. Otis Denton, 14105 Lorain Ave., Cleveland, Ohio, writes: "I picked up $1800 while studying. The time I gave my Radio work did not interfere with my other business."

Find Out What Radio Offers

My book has shown hundreds of fellows how to make more money and win success. It's FREE to any ambitious fellow over 15 years of age. Investigate. Find out what Radio offers you. Read what my graduates are doing and making, about my Money Back Agreement, and the many other N. R. I. features. Mail the coupon in an envelope or paste it on a 1c post card TODAY.

J. E. SMITH, President, Dept. 6GH
National Radio Institute, Washington, D. C.

J. E. SMITH, President
National Radio Institute
The man who has directed the Home Study Training of more men for the Radio industry than any other man in America.

Rich Rewards in Radio

HERE'S PROOF that my training pays

Gets Job While Training

"Before finishing your Course I was Radio Expert for the largest sporting goods store in North Carolina. Since enrolling I have made about $8,500. I want to thank N. R. I."—**J. F. Huff**, 601 W. 18th St., Austin, Texas.

Makes More Money Than Ever Before

"I am making more money now than I have ever made. My gross income in cash one month was over $500 and I also did a credit business which ran something over $200. Any time I can speak a good word for N. R. I., I will be glad to do it."—**Otis K. Wolfe**, Harlan, Ky.

N. R. I. Course Pays for Itself

"At the end of my first year I more than tripled the cost of my Course. Other fellows need not be afraid to start the Course for fear they cannot pay for it, because it more than pays for itself."—**F. E. Sanderson, Jr.**, Moyock, N. C.

MAIL THIS NOW

J. E. SMITH, President, Dept. 6GH
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligating me, send your book which points out the spare time and full time job opportunities in Radio and your 50-50 method of training men at home in spare time to become Radio Experts.

(Please write plainly)

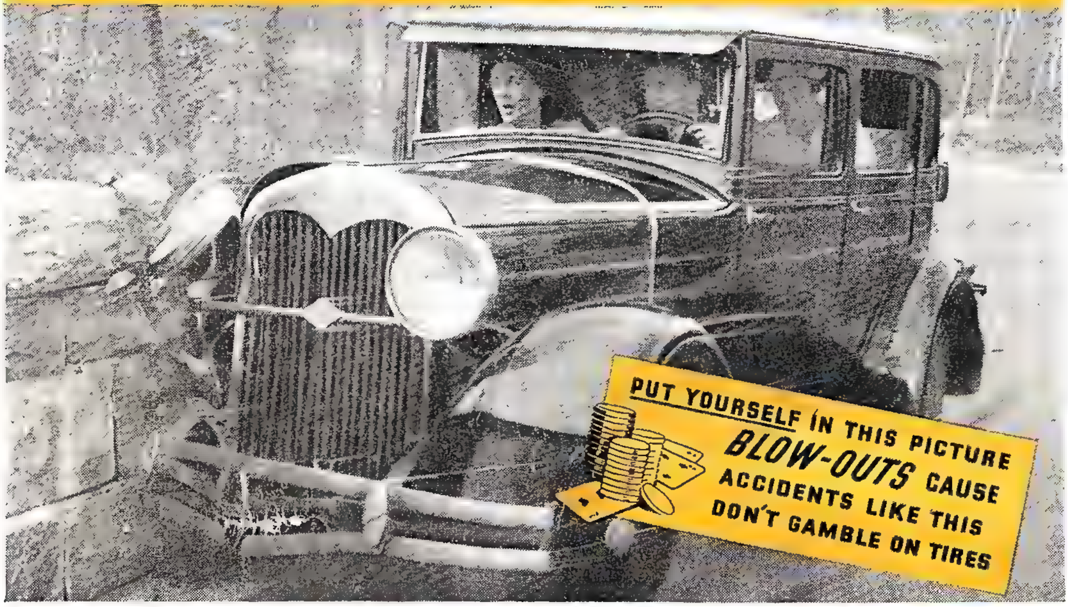
NAME ....AGE ....

ADDRESS ....

CITY ....STATE ....

(If you do not want to cut this cover simply write us on a post card)

DOES IT PAY?


PUT YOURSELF IN THIS PICTURE
BLOW-OUTS CAUSE
ACCIDENTS LIKE THIS
DON'T GAMBLE ON TIRES

ONLY SILVERTOWNS GIVE YOU GOLDEN PLY *Blow-out* PROTECTION

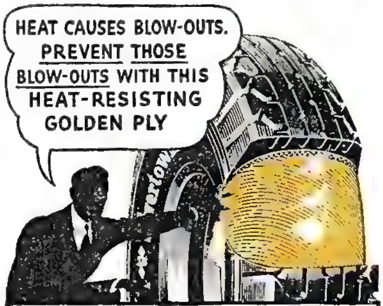
Put yourself in this picture. Don't risk a blow-out accident like this. Unless you are protected, the chances are better than even you will have a blow-out some day.

* * *

When thousands are killed or injured in blow-out accidents every year isn't it foolish to take unnecessary chances? Even at normal speeds of 30 or 40 miles an hour, terrific heat is generated *inside* the tire. Rubber and fabric pull apart. A blister forms and grows bigger and bigger until—sooner or later—BANG! A blow-out!

To protect you, the Life-Saver Golden Ply is built into every new Goodrich Safety Silvertown. This ply has a special heat-resisting construction developed by Goodrich engineers to keep blisters from forming and overcomes the great, unseen cause of high-speed blow-outs.

Have your Goodrich dealer equip your car with a set of Golden Ply Silvertowns. They'll give you greater safety and months of extra trouble-free mileage. Yet they cost no more than other standard tires.


HEAT CAUSES BLOW-OUTS. PREVENT THOSE BLOW-OUTS WITH THIS HEAT-RESISTING GOLDEN PLY

FREE! Join the Silvertown Safety League. Sign the Safe Driving Pledge and your Goodrich dealer will get for you absolutely free a tail-light emblem with red crystal reflector. No obligation to buy.

The new Goodrich SAFETY Silvertown

With Life-Saver Golden Ply Blow-Out Protection

Double Page Spreads

A frank man to man talk about PATENTS-INVENTIONS -SELLING INVENTIONS

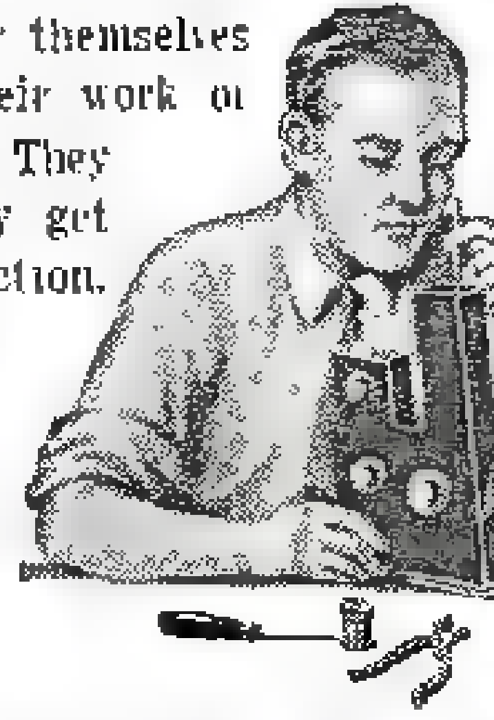
THE world of invention moves on. The Patent Office clerk who resigned his job back in 1833, because he said there was nothing left to invent, now stands out as one of the funniest men in American History. Think of everything that's happened in the last 100 years! Why, only recently the papers carried a notice that an obscure worker, Hans Wach, has invented a simple device to utilize exhaust steam on steam boats. *Already, the report states, the steam ship lines have saved more than $15,000,000 in fuel bills with his invention.* Almost in the same breath the Dept. of Commerce announces that it will soon test out a new non-crashable aeroplane, which the average man can learn to fly in a day, which will travel at 110 miles an hour and sell at the price of a cheap automobile. An unknown Seattle man has invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

Remember this: For every outstanding big invention there are thousands of small, simple things for use in the home, the office, the factory, on the farm, on every sort of travel conveyance. Little articles like you find on the counters of a 10-cent store, hardware store, drug store, toy and novelty shop.

Many Little Ideas Have Big Commercial Possibilities

A person finds something he's using doesn't work right, or it's clumsy, or costs too much. He gets a happy thought. He improves the old Article. That's contribution to human progress. That's the way that many, many men have reached the goal of financial comfort, independence and even wealth. Most of the things millions of us use didn't come from the brains of engineers and physicists. They came from the mind and maybe the crude home work bench of Mr. Average Man, busily engaged in earning his bread and butter at whatever chance or circumstance has given him to do. The "little" man's opportunity as an inventor was never greater than it is today.

Who Are Inventors?



You'd be amazed at the men we contact in the course of a busy year. Most of them do not consider themselves inventors at all. During their work or leisure they get an idea. They work it out on paper They get in touch with us about Protection. Did you know that a dentist invented the stock ticker, a school teacher the telephone, a farmer the typewriter, an artist the telegraph? Did you know that the crinkly hair pin—sold by millions now—came about because a husband saw his wife twisting the old-fashioned straight hair pin to make it stay in place? **Poor men who have no thought of invention now will be financially well-fixed in a few years because of a happy thought that the world could use to advantage.**

Can You Answer These Questions?

Ask yourself these questions: How do the Patent Laws protect me? What easy steps can I take, without cost, to put myself in position to support my belief that I am the *first* man to think of *my invention*? Is a Patent worth the cost? Do I need a model? Should I try to sell my invention before I have it Patented? Is there any safe, business-like way to secure financial help? If I do apply for a Patent how shall I reach people who can market my invention? Can I protect and sell an improvement on some invention that has already been patented? These are but a few of the questions which usually confront the average man. You need the answers! **YOU CAN HAVE THEM, without cost, trouble, or delay.**

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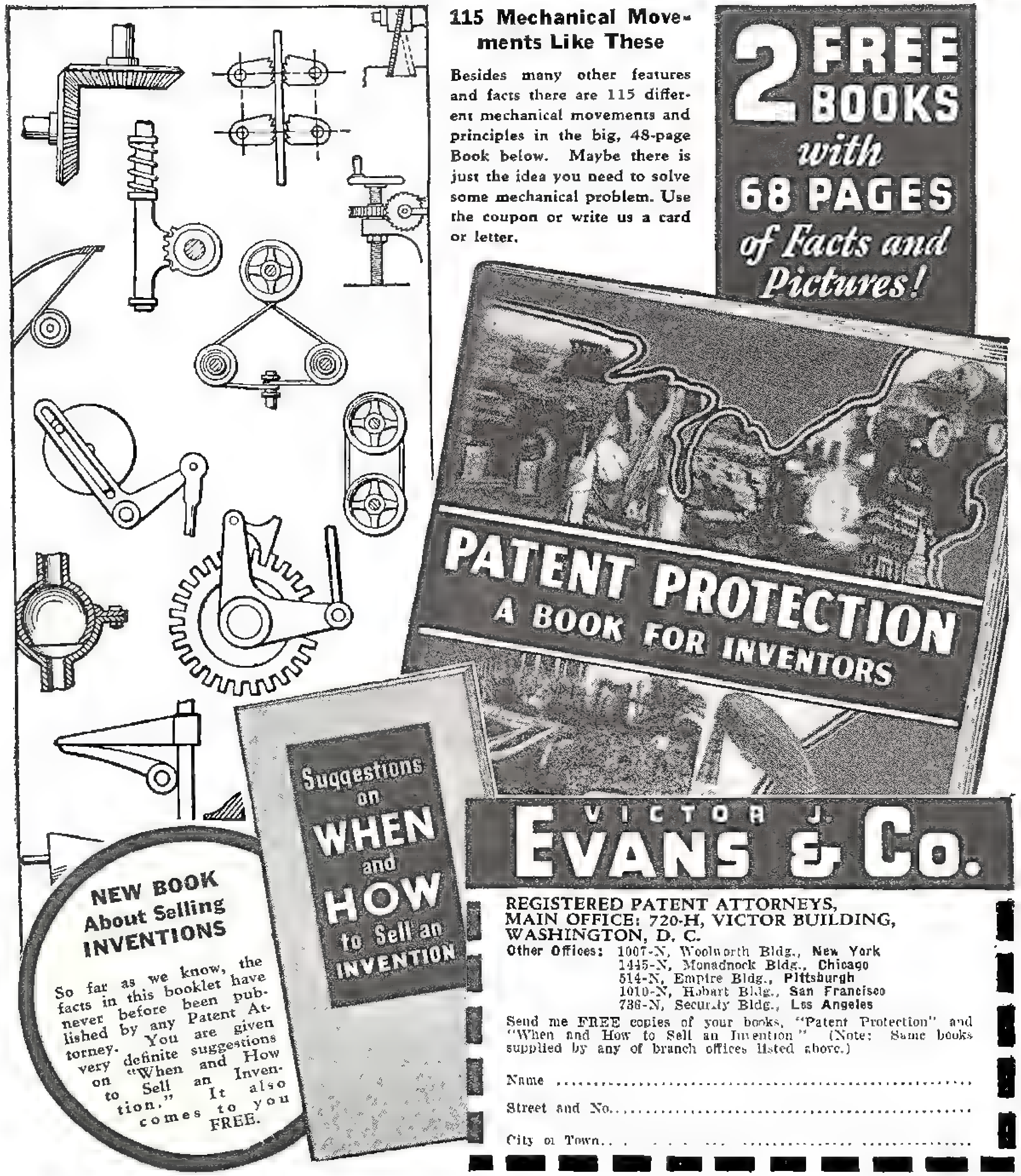
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INVENTORS

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Random Chips from the Editor's Workbench

Soap Box racers invade MM Boat fans show ingenuity. Midget car builders report success. Editor issues call for photographs. Distant countries are heard from.

WHAT the Indianapolis Classic is to auto racing and the Kentucky Derby is to horse racing, so the Soap Box Derby is to every youthful driver who has ever piloted a four-wheeled push-mobile down the biggest hill in the neighborhood. These free-wheeling chariots have got a certain zip and dash to them that none of the big cars seem to have, and for that reason the Soap Box Derby is fast becoming a national institution, just like the Classic and the Derby.

Now that vacation time is here again, it seems that most of the boys in the country are out building their racing soap boxes or hunting for plans to go by. MM is on hand to co-operate with all the builders. Not only are we running a big feature in this issue on all the mechanical details which go into a racer, but we are giving away two complete Soap Box racers and a set of balloon tired wheels as prizes in a new contest. You will find the details on Page 54.

***

This brings us right up to our own workbench contest. This time the first prize of $5 goes to Don Weisbard of Hollywood, Cal. Don decided to use the experience he had gained as a soap box engineer to build a midget automobile. That he was successful can be judged from the photo which appears on this page. His letter follows:

Hollywood, Cal.

Dear Editor:

Enclosed herewith is a photo of a midget car powered with a one-lung, two-cycle motorcycle engine. I built it myself from scrap materials. It has a five foot wheel base, is seven feet long and thirty inches high. It has a low and high gear, a plate clutch and chain drive. She will do about 38 miles per hour when wide open.

I found that aluminum disk wheels were necessary in the rear as the spoke wheels can't take it when the power is applied. The spoke wheels work fine, however, in front.

The little model next to it (in the photograph) is designed from a midget auto racer and is only ten inches long It has an all-metal body, dummy engine, steering device, etc. I expect to have it chromium plated.

Don Weisbard.

***

Our boat building fans were present in even increasing numbers this month. One of them, Ed Olson of San Carlos, Cal., walked off with the second prize of $3 in our monthly Editor's Workbench Contest. He writes:

San Carlos, Cal.

Dear Editor:

I am sending you a picture of the kyack my friend and myself built. We had great fun building it from plans we found in the first edition of "How To Build 20 Boats." After a great deal of thought and study, the plans were changed to hold two people instead of one. It has carried 340 pounds easily.

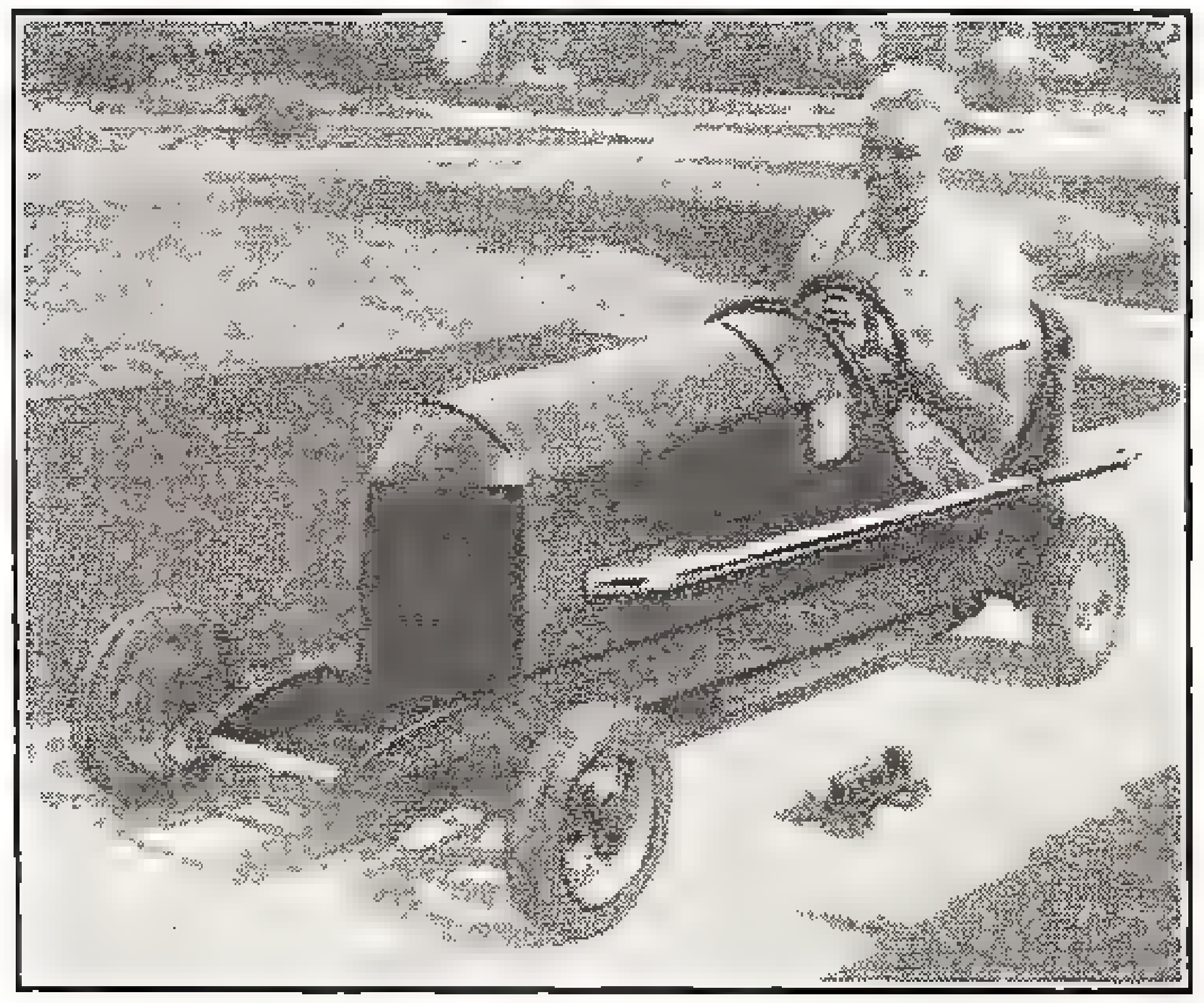
I do not dislike any article in good old MM.

Ed Olson.

We have some good news for many of our readers in regard to our first edition of *How To Build 20 Boats*. After turning down orders right and left for nearly a year because we thought the edition was out of stock, Jimmie, the stock boy, reports that he found about 200 copies while moving the MM files to new quarters. You can get your copy of the first edition of *How To Build 20 Boats* now, if you hurry, by sending fifty cents to this office. The second edition is also in stock. Be sure to specify which edition you want.

***

One of our Paragraph Oddities in a recent issue concerning the custom of driving to right or left in Austria brought an interesting letter from one of our British readers. He has driven all over Europe and he says, quoting parts of his letter:



As neat a job as we have seen in this office for some time is this midget racer built by Don Weisbard. Note the model beside it. Don wins the first prize of $5 for this month.

Eggar's Hill, Aldershot, England

Dear Editor:

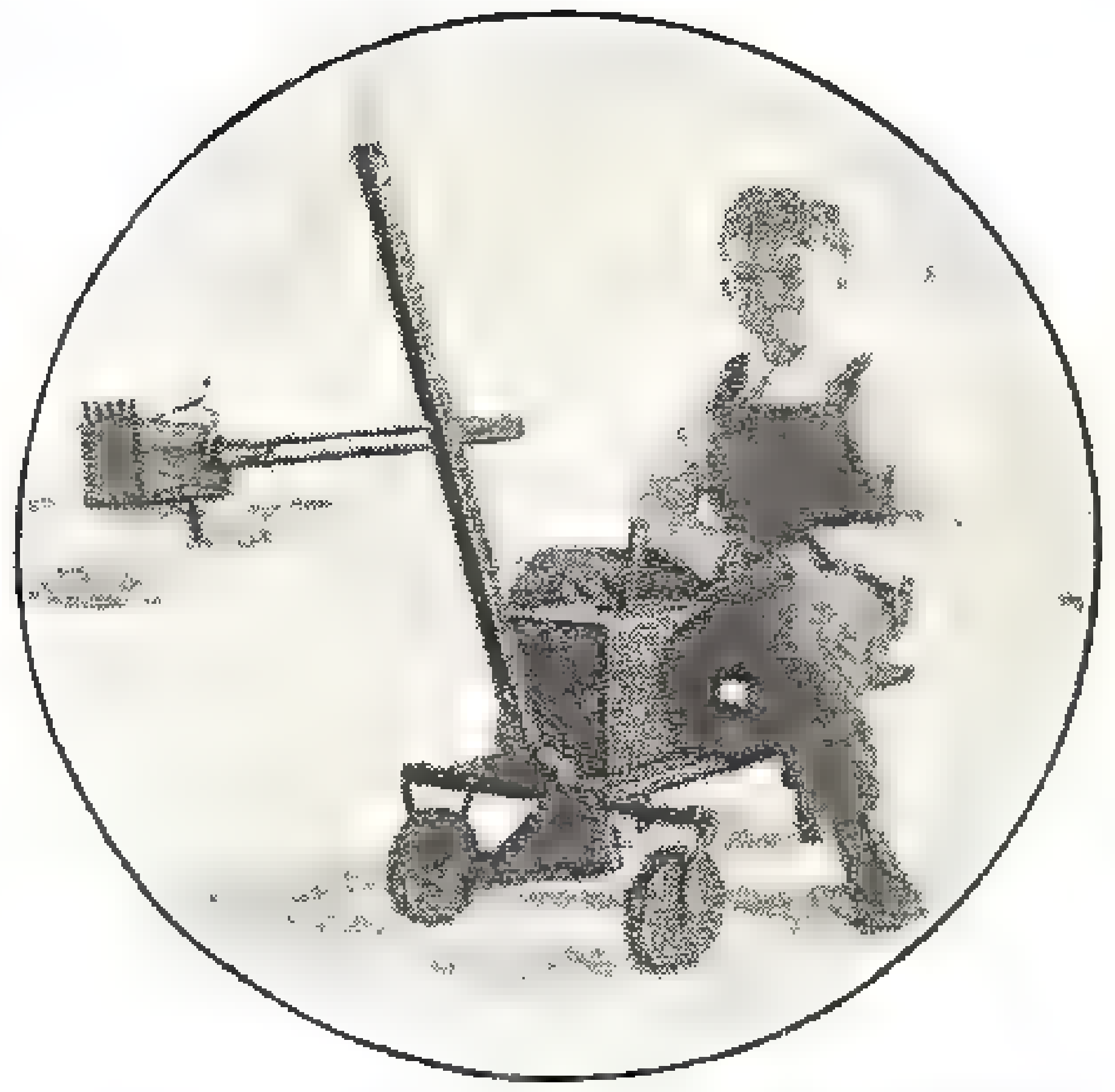
Having read the paragraph in a recent edition of your excellent magazine, I thought I might be able to enumerate a few other points of interest about driving an automobile in Europe. Most countries in Europe have their own special laws, confusing to the foreigner. For instance, in Czecho-Slovakia it is an offense to smoke while driving. In Germany one must not carry any red lights on the car. Thus most of the tail lamps are orange.

On the mountain roads in Switzerland some of the roads are very steep and narrow. A one-way traffic system is in operation, cars going up at one time, and down at another. Mail trucks are painted yellow, and the motorist must always pass these trucks on the precipice side of the road so that whatever may befall, it will not be the mail truck which goes over the cliff.

In France the small villages have open drainage systems carried across the main road by a trench about two feet wide and one foot deep. These ditches are very dangerous, being quite invisible in the cobbled streets. In Yugo-Slavia cars are very rare and there are few roads. Needless to say there are no garages and petrol is bought at the local chemists for about a dollar a gallon. In Monaco, the small state containing Monte Carlo, one's speed must never exceed 9 miles per hour under normal circumstances, and a walking pace in dangerous places. Failure to comply often entails confiscation of one's automobile. In Holland heavy motorcars must have a deep noted horn, and a light car or motorcycle a high pitched one.

I hope these points may be of interest to you.

Arthur Garratt.



This boy-powered scoop shovel, built from MM plans as a present for his brother, wins for Gordon Christiansen the third prize of $2.

***

The third prize of $2 this month goes to Gordon Christiansen for his boy-powered steam shovel. Here is what he says about it:

Ryder, N. Dak.

Dear Editor:

I am enclosing a snapshot of the boy-powered steam shovel built from plans in the April, 1935, issue of MM. (Also included in the 1936 "How To Build It" Book). I built it as a present for my brother.

It is surprising how well it works. The things it can do far exceed what I expected of it.

The articles I least enjoy in MM are magic tricks for the amateur, but as a whole I like most all of the articles. I miss one page that used to be in the magazine called "Auto Generator Kinks." Long live MM Magazine. I think it is a great book.

Gordon Christiansen.

Here is an enlarged version of MM's kyack plans. It was built for two passengers instead of one by Ed. Olson. He wins the second prize of $3 in the monthly Workbench contest.

Right now we want to register a complaint against you. Yes, you—the reader! You are too modest. While you are all willing to send us all kinds of photos, few of them are clear enough for publication. If you want to win prizes in the Workbench's monthly contest, take a little time to get good photographs of the things you are building. Don't shoot snaps of the project itself. Put yourself in the picture or let a friend pose for you. We need pictures but they must be good pictures. And don't forget one of the requirements of each month's contest is, you must state which article or department you liked best, and which least.

***

Another midget car builder writes in to say:

Mauch Chunk, Pa.

Dear Editor:

I have just built a midget car during my spare time. She does the one fifth mile in 12 seconds and holds the road like a Cord. She is a front-drive 4 wheel brake job driven by a motorcycle engine. Makes thirty miles to the gallon and weighs 1,150 pounds. Uses 20x4 tires mounted on 12-inch wire wheels. Qualifies under all midget racing classifications. I will answer any questions concerning car if readers will ask me.

William Miller.

***

Here is a letter from a fan who believes in putting his workshop and MM to work. He makes it a point to keep all his MM copies on file where they can be located as needed. That it is a good policy you all will agree when you read his letter.

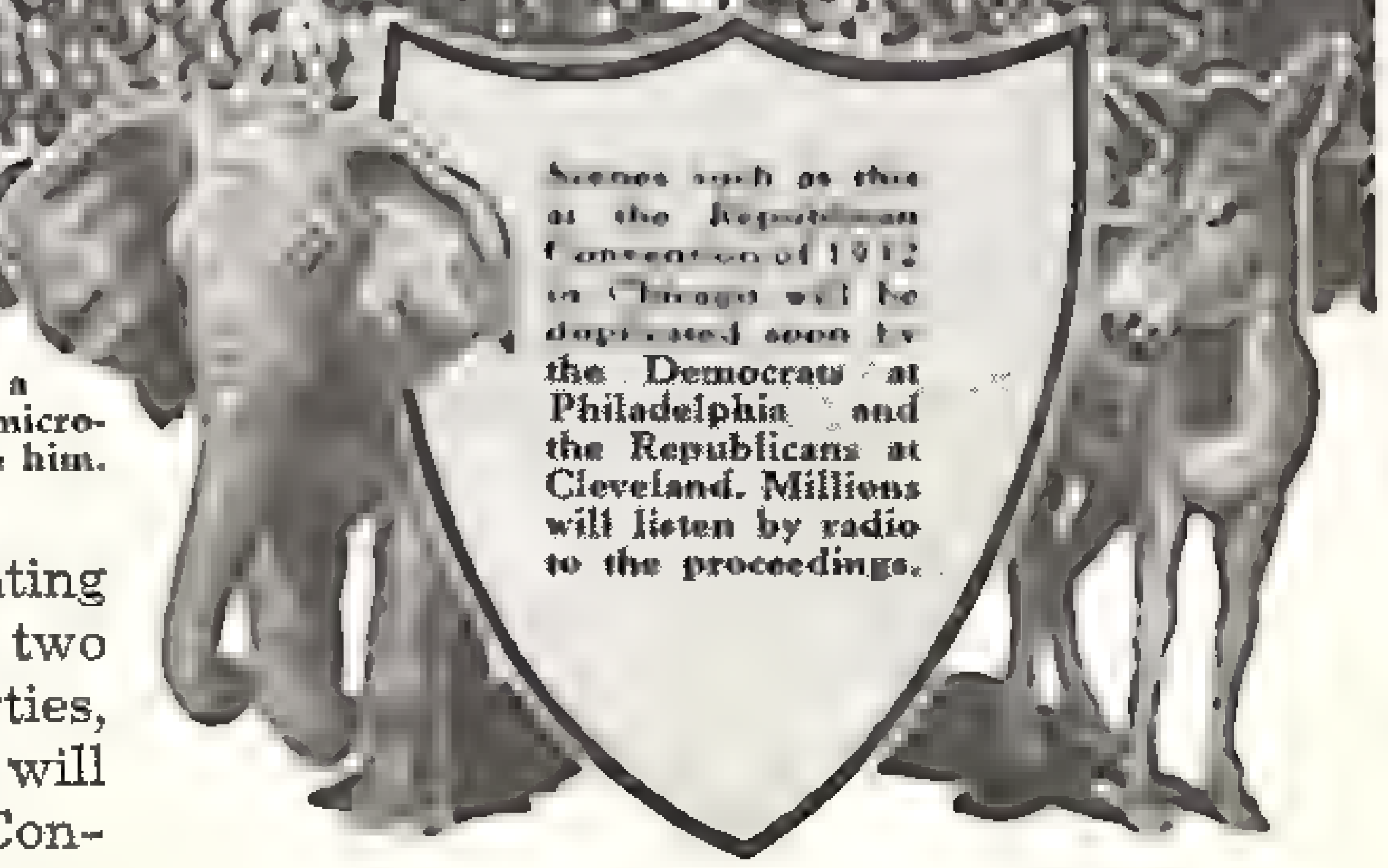
[*Continued on page 22*]

The NATION *Sits in on* National Conventions

by BOB GORDON

Politics becomes mechanically minded in 1936, and both Republicans and Democrats are providing the machinery which will permit the nation to listen in to the proceedings.

Circle, above—Gov. Pollard of Virginia proposes a resolution at a National Convention. Note directional microphone behind him and broadcasting microphones before him.



Scenes such as this at the Republican Convention of 1912 in Chicago will be duplicated soon by the Democrats at Philadelphia and the Republicans at Cleveland. Millions will listen by radio to the proceedings.

THE political machinery for nominating the presidential candidates of the two major parties remains as old as the parties, but in June this year the entire nation will be given ringside seats at the National Conventions at Philadelphia and Cleveland, with both parties taking advantage of every latest scientific wrinkle to bring the conventions to your home or local movie.

In stadiums, ball parks and town squares loud speaker systems will be set up for the hundreds of thousands of persons who will assemble on the evening of June 27 to hear President Roosevelt accept the Democratic nomination. Republicans, too, are planning on having their candidate broadcast his acceptance of the nomination from their convention hall.

More than six thousand persons will journey to the convention cities to select the men for whom you will vote this fall. There will be 1,200 delegates at the Democratic Convention in Philadelphia, with 1,700 alternates, while the Republicans at Cleveland will have 997 delegates and 1,116 alternates. Then there will be the 106 National Committeemen of each party, more than 1,000 reporters, and several hundred telegraph, radio, newsreel men and news photographers.

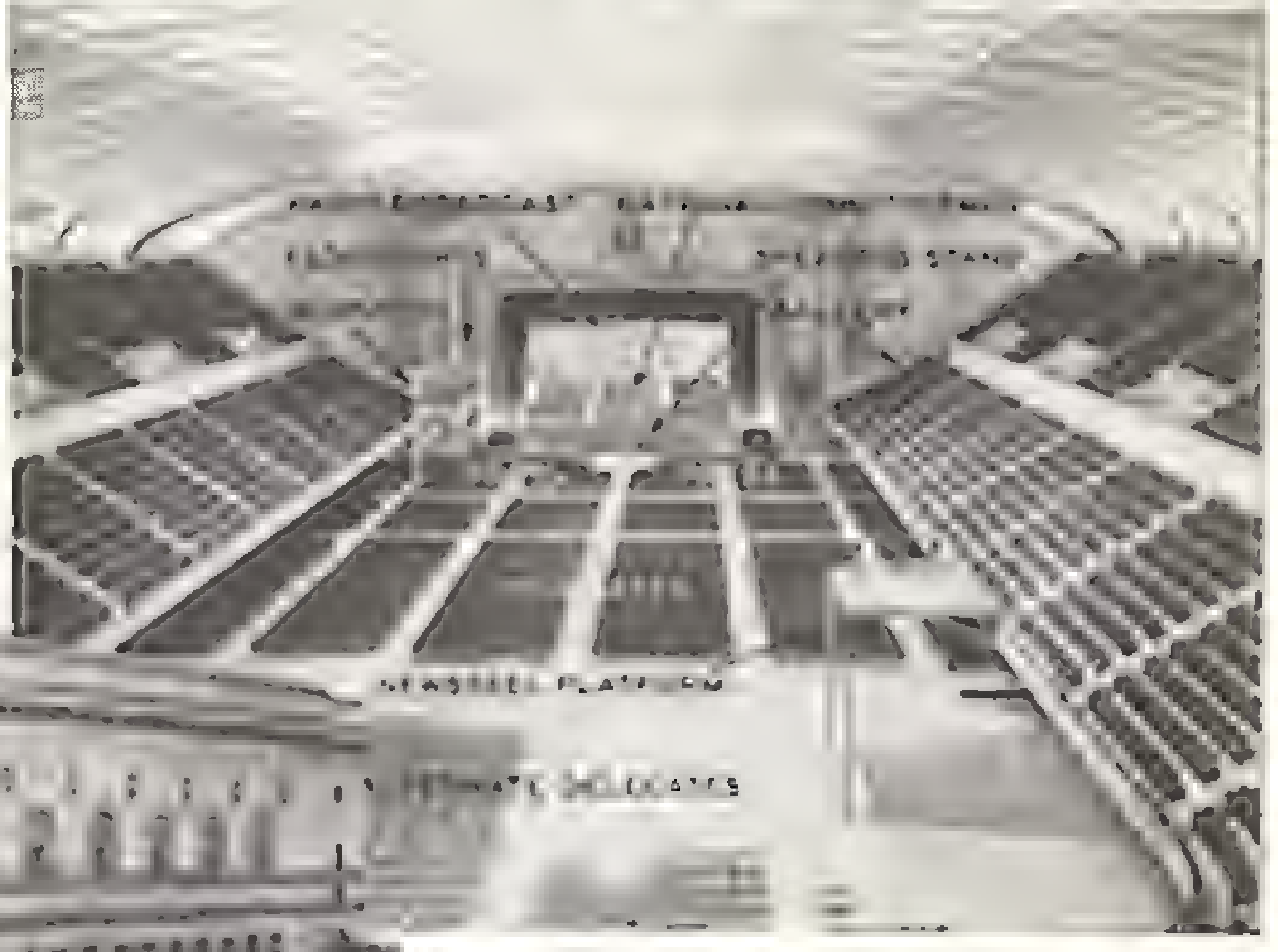
The voting delegates will be seated in the front of the hall in four gigantic banks of seats. Delegations from each state will be seated together, with huge signs designating the seats. The alternates will have chairs on the auditorium floor directly behind the delegates. Aisles between the banks of seats will be especially wide.

The speakers' stand will be an elevated platform erected on the front center of the stage. On this platform will be the Chairman of the Convention and the principal speakers for the day. On this platform also will be the operator who will control the radio and newsreel microphones and the public address system through a maze of 53 switches.

From a technical point of view, this switchboard operator will be the most important man in the convention hall, for he will have complete control of all sound effects. It will be he who will, under the direction of the Convention Chairman, sort out the correct speeches from the bedlam created by a thousand men all anxious to talk at once, and to see that the voice of only the speaker recognized by the chair is amplified on the public address system, is broadcast to the nation over the three networks, and is recorded by the newsreel camermen.

On the rostrum of the speakers' platform will be the three microphones of the broadcasting companies. The voice of the regular speakers will be carried directly to the soundproof studios erected over the back of the stage, and from there, over telephone lines, will be carried to the hundreds of broadcasting stations on the networks. The five newsreel companies will also have microphones here connected directly with recording ap-

[*Continued on page* 129]



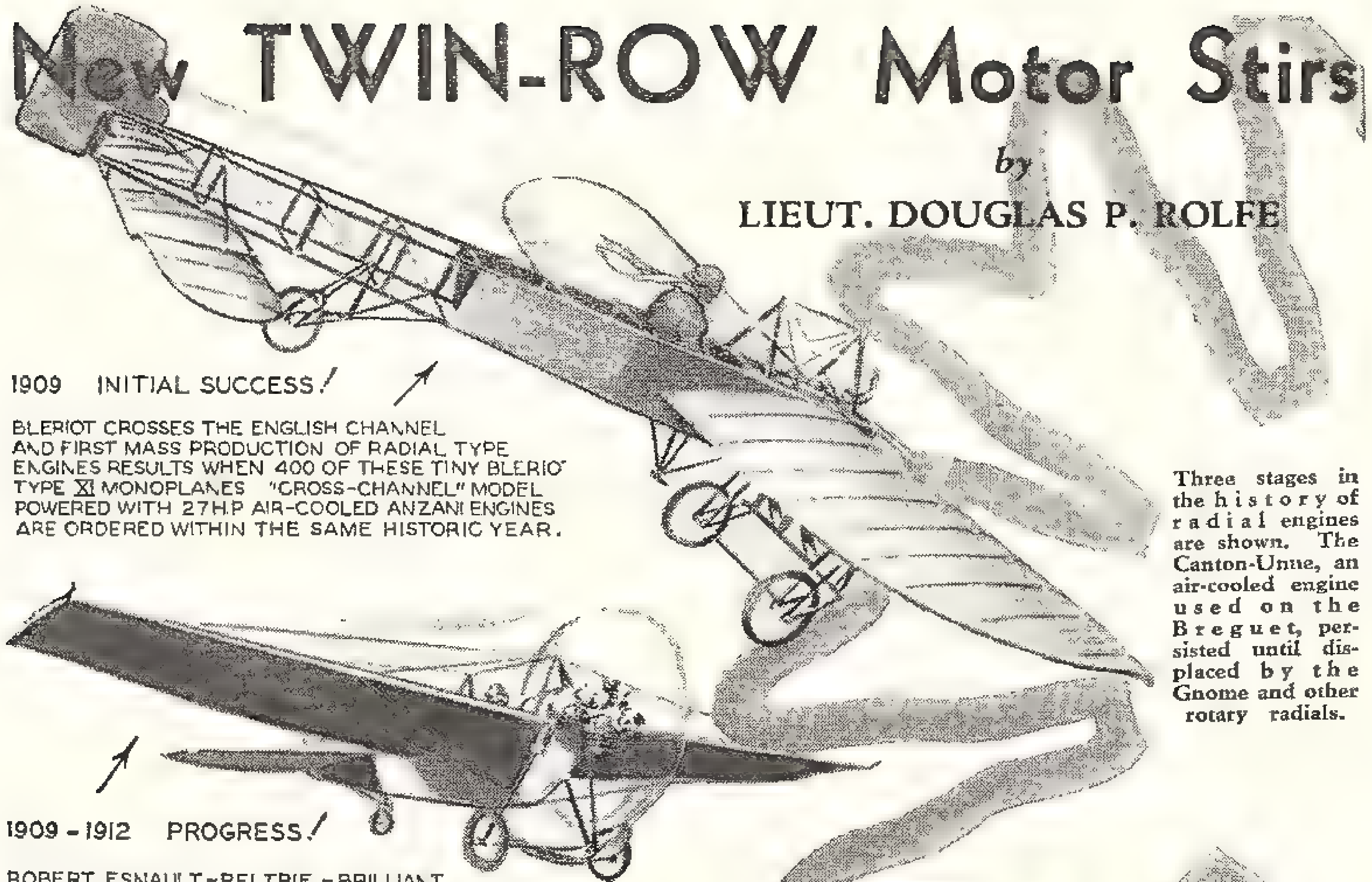
The nation, in the form of radios, news reels and newspapers, will have the chosen seats at the Democratic Convention in the Philadelphia Auditorium. Above is shown seating arrangement. Left—The Cleveland Auditorium into which will parade 997 Republican delegates; 1,116 alternates.

Wild demonstrations accompanied the nomination of Franklin D. Roosevelt, Democrat, for the presidency in 1932. All state delegates, bearing placards, paraded past the speaker's table.

New TWIN-ROW Motor Stirs AVIATION

by

LIEUT. DOUGLAS P. ROLFE



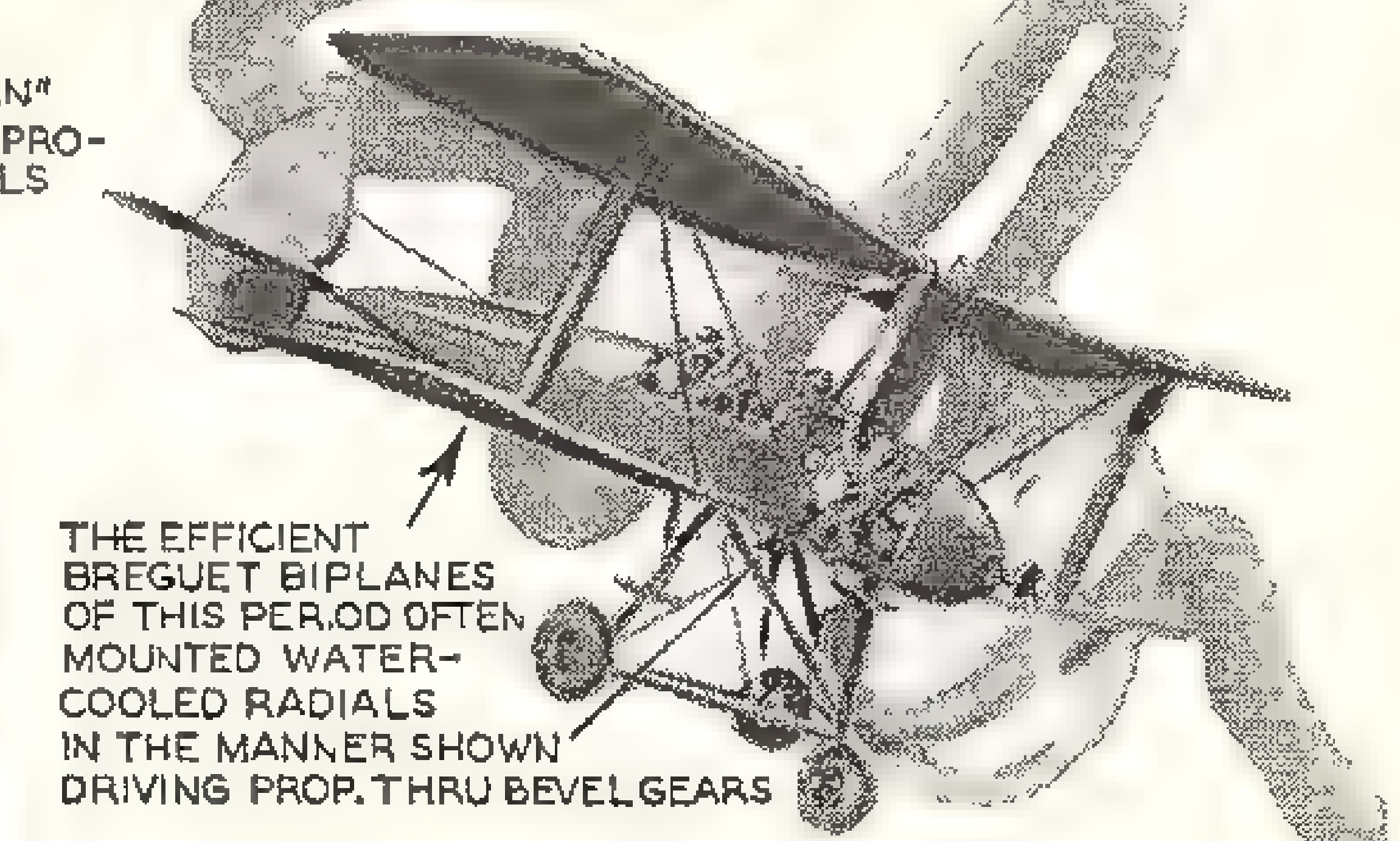
1909 INITIAL SUCCESS!

BLERIOT CROSSES THE ENGLISH CHANNEL AND FIRST MASS PRODUCTION OF RADIAL TYPE ENGINES RESULTS WHEN 400 OF THESE TINY BLERIOT TYPE XI MONOPLANES "CROSS-CHANNEL" MODEL POWERED WITH 27H.P AIR-COOLED ANZANI ENGINES ARE ORDERED WITHIN THE SAME HISTORIC YEAR.

1909 - 1912 PROGRESS!

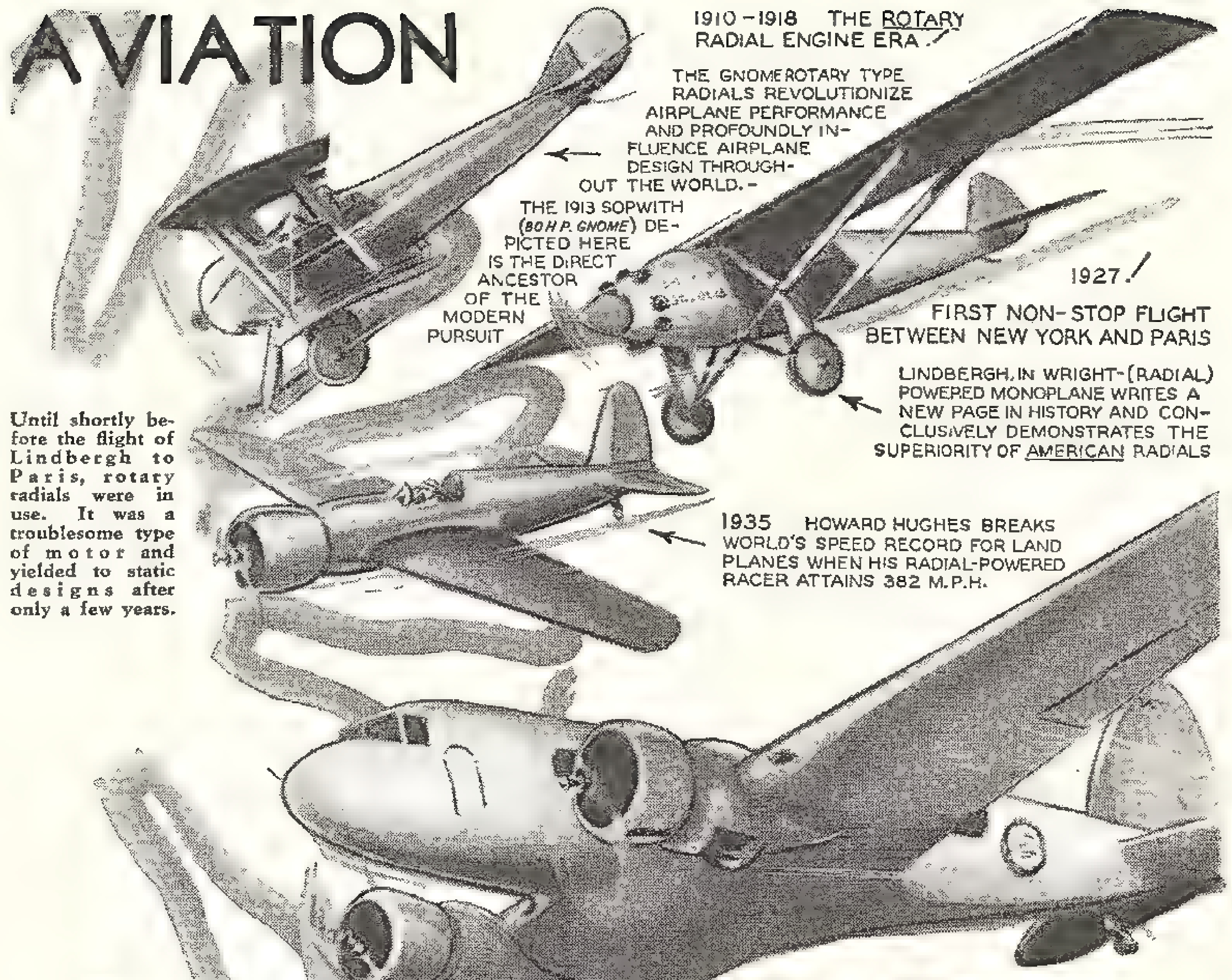
ROBERT ESNAULT-PELTRIE - BRILLIANT FRENCH AERONAUTICAL ENGINEER AND EARLY EXPONENT OF STEEL TUBE CONSTRUCTION INTRODUCES THE "FAN" TYPE RADIAL, AND LIKE BREGUET (*CONTEMPORARY AND OF EQUAL FAME*), PRODUCES A SERIES OF PLANES POWERED EXCLUSIVELY WITH RADIALS

Three stages in the history of radial engines are shown. The Canton-Unne, an air-cooled engine used on the Breguet, persisted until displaced by the Gnome and other rotary radials.



THE EFFICIENT BREGUET BIPLANES OF THIS PERIOD OFTEN MOUNTED WATER-COOLED RADIALS IN THE MANNER SHOWN DRIVING PROP. THRU BEVEL GEARS

Until shortly before the flight of Lindbergh to Paris, rotary radials were in use. It was a troublesome type of motor and yielded to static designs after only a few years.



1910 - 1918 THE ROTARY RADIAL ENGINE ERA.

THE GNOMEROTARY TYPE RADIALS REVOLUTIONIZE AIRPLANE PERFORMANCE AND PROFOUNDLY INFLUENCE AIRPLANE DESIGN THROUGHOUT THE WORLD.-

THE 1913 SOPWITH (*80 H.P. GNOME*) DEPICTED HERE IS THE DIRECT ANCESTOR OF THE MODERN PURSUIT

1927.

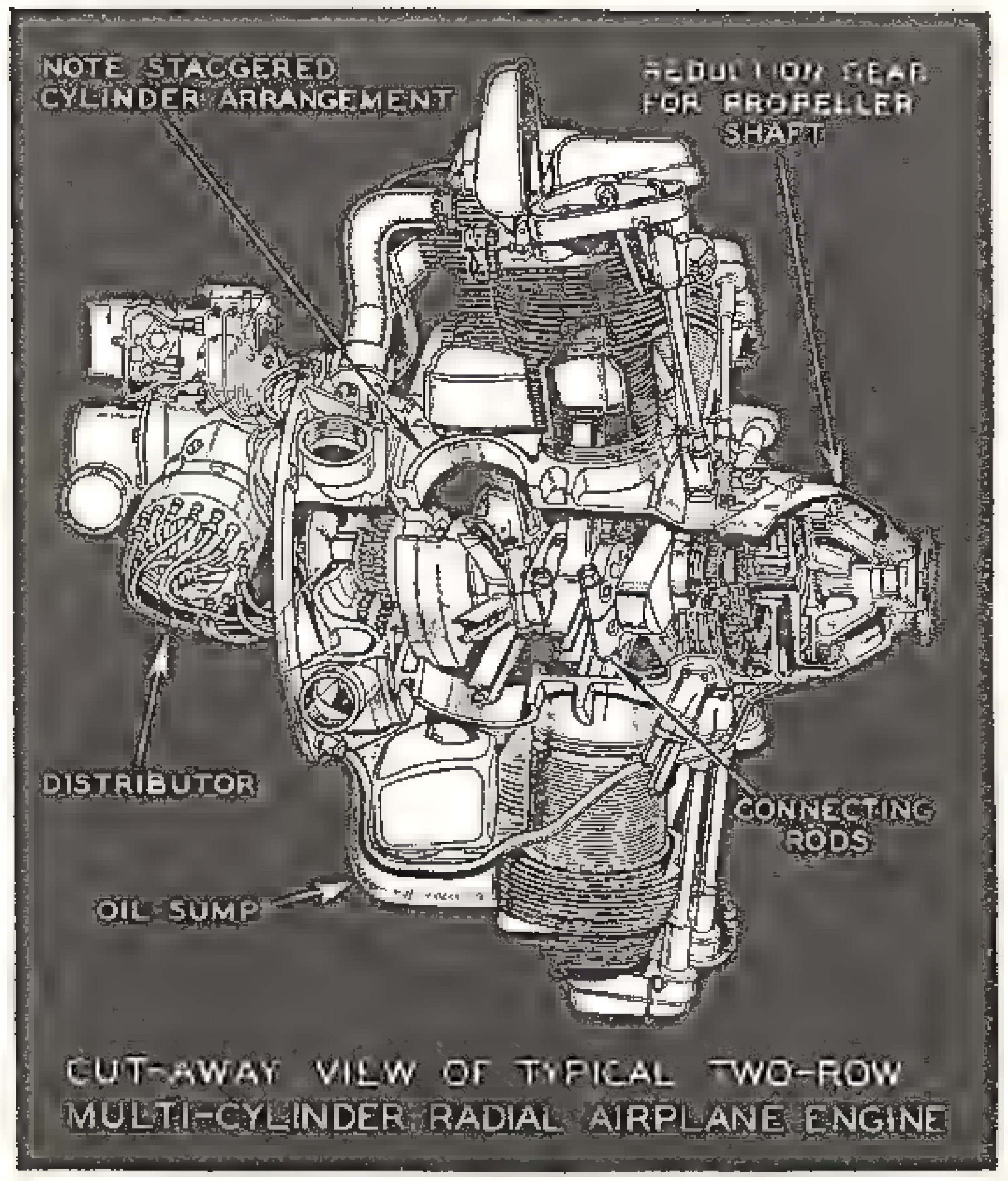
FIRST NON-STOP FLIGHT BETWEEN NEW YORK AND PARIS

LINDBERGH, IN WRIGHT-(RADIAL) POWERED MONOPLANE WRITES A NEW PAGE IN HISTORY AND CONCLUSIVELY DEMONSTRATES THE SUPERIORITY OF AMERICAN RADIALS

1935 HOWARD HUGHES BREAKS WORLD'S SPEED RECORD FOR LAND PLANES WHEN HIS RADIAL-POWERED RACER ATTAINS 382 M.P.H.

TODAY.

THE DOUGLAS DS-3 - WORLD'S NEWEST AIRLINER - IS POWERED WITH THE LATEST TWO-ROW RADIALS


NOTE STAGGERED CYLINDER ARRANGEMENT
REDUCTION GEAR FOR PROPELLER SHAFT
DISTRIBUTOR
CONNECTING RODS
OIL SUMP

CUT-AWAY VIEW OF TYPICAL TWO-ROW MULTI-CYLINDER RADIAL AIRPLANE ENGINE

This particular engine has a reduction gear to the propeller shaft. Note the overall length of the motor. Bleriot's first flight across the English Channel gave the radial air engine its first impetus. The immediate result of his venture was the sale of hundreds of the Type XI or Cross-Channel model. Equipped with three-cylinder, air-cooled Anzani radials, these little ships were soon flying all over the world. The light rotary radial followed and persisted until after the World War. By 1920, there was a swing to "in line" and "V" engines.

TWENTY-SIX Twin Wasp engines of 1,000 horsepower will begin service in July on air liners as the latest triumph in radial engine design.

A far cry from the three-cylinder radial motor which bore Louis Bleriot over the English Channel in 1909, the new engines are described as the mightiest yet built for regular service.

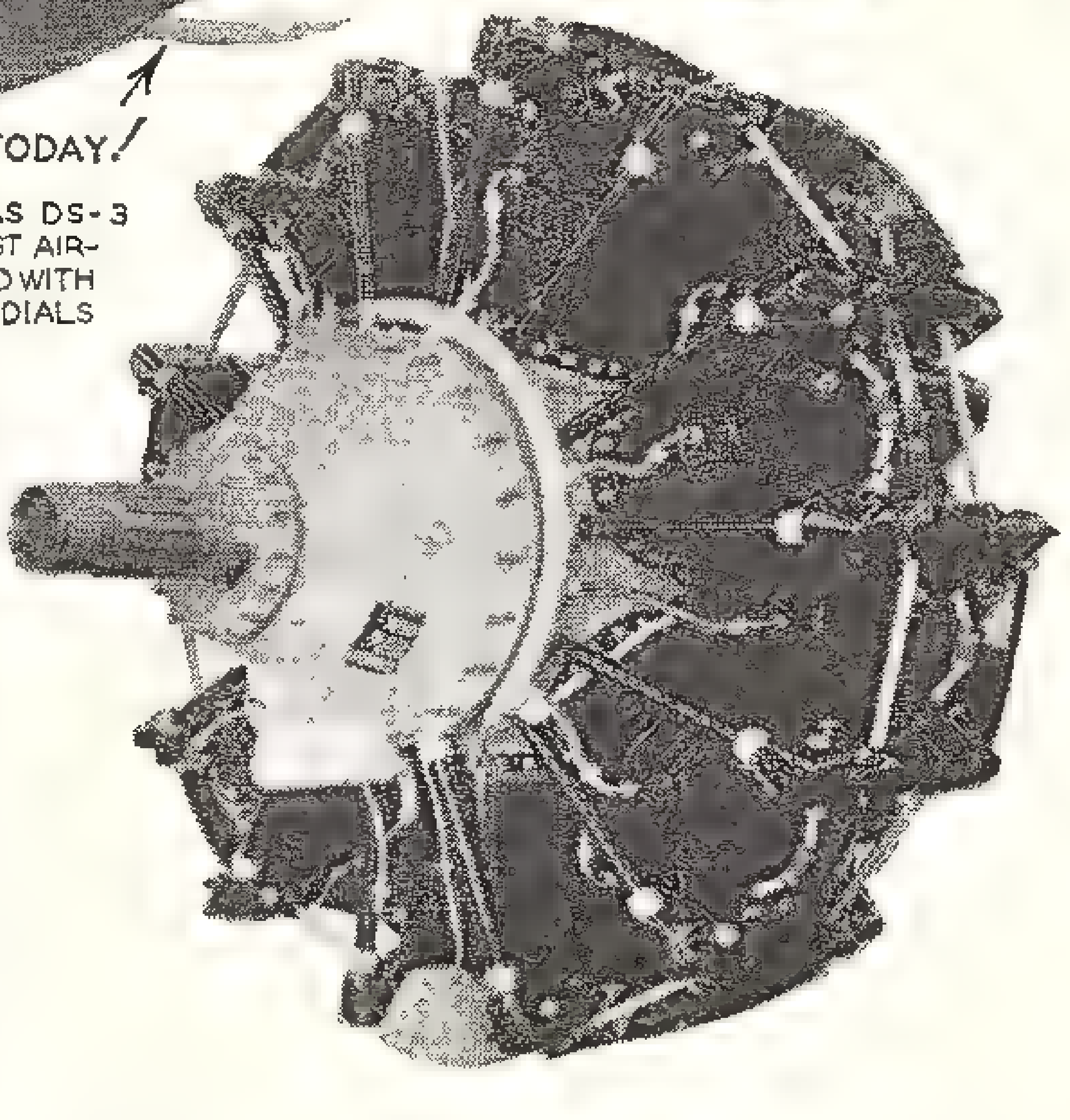
The new air-cooled engine is the 1,830 Wasp of Pratt & Whitney. The 14 cylinders are in two circles, one behind the other. Normal power maximum is 1,000 h.p. with an emergency maximum of 1,150 h.p. Weighing 1,250 lbs., the motor develops, at sea level, a horsepower for each 1.09 lbs.

It will enable the Douglas DC-3's of the United Airlines to cruise at over 200 miles per hour and to fly non-stop from San Francisco to Salt Lake, Salt Lake to Chicago, and Chicago to New York. The Navy has ordered 200 of the engines for combat and patrol planes and is barring their export.

At its first public demonstration in East Hartford, Conn., the new engine took up a two-year-old Vought Corsair with a run of only 150 feet. After banking once, Pilot H. H. Sargent sped by observers at 225 m.p.h. Witnesses said the roar of the engine was the deepest in their experience.

"The time has come when the single row radial air-cooled engine in large transport operation is as obsolete as the four-cylinder automobile engine," said Charles W. Deeds, Pratt & Whitney general manager.

The new engine is the result of experimentation which began in 1929 when Pratt & Whitney engineers became convinced that the economical power limit of the normal nine-cylinder radial engine had been reached.



This is the new 1830 Wasp. Smoother operation and longer life as well as tremendous power are claimed for the 14-cylinder two row design. There are 250 light impulses per second from a 5½-inch cylinder at cruising horsepower. The combination of high crankspeeds with comparatively small cylinders permits a greater mean effective pressure with any given fuel. More power for a given displacement can be obtained. Automatic valve gear lubrication and mixture control and 21,000 square inches of cooling surface are features.

LIGHTING THE WAY FOR COLOR MOVIES

by EARL THIESEN

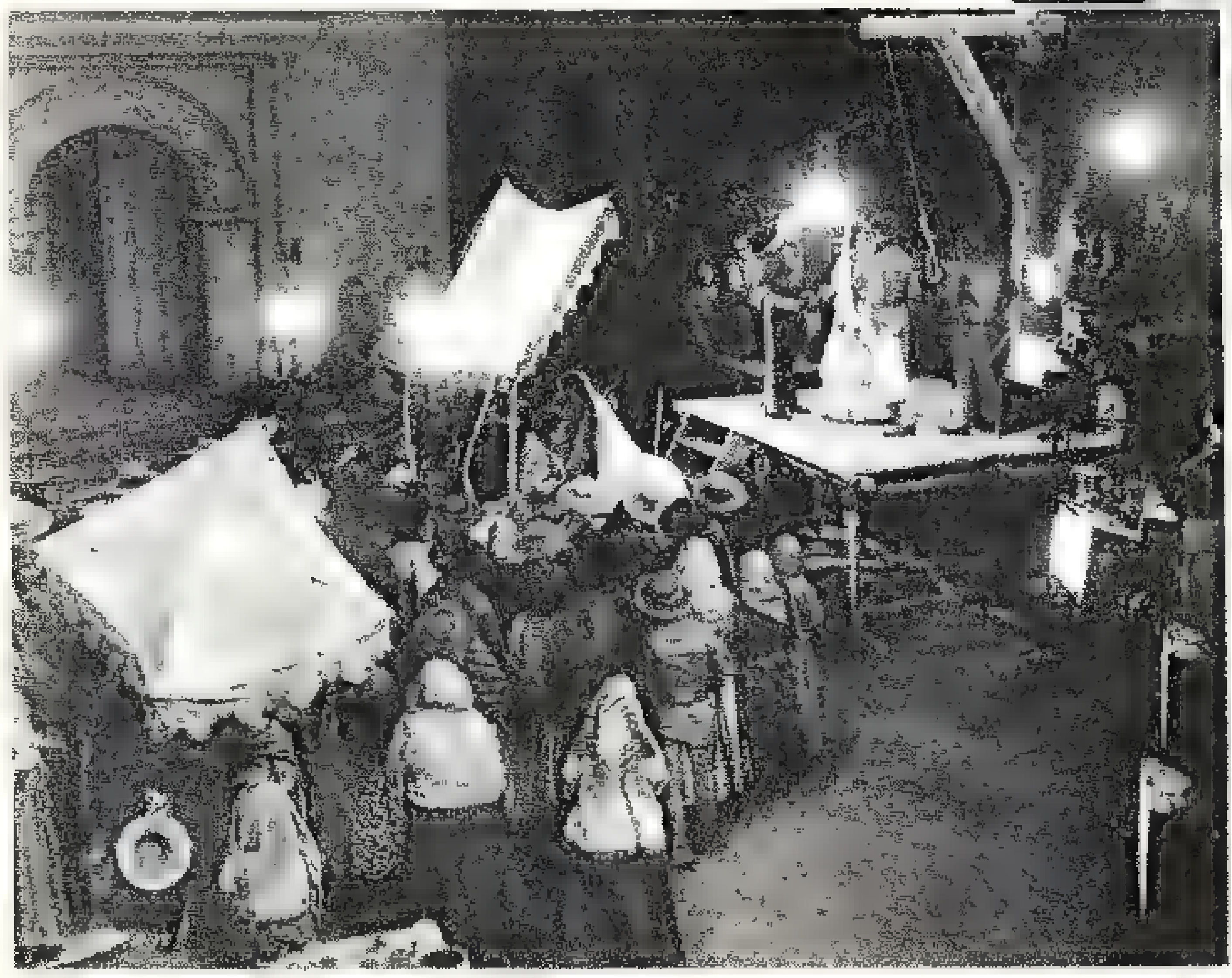
Fascinating as the miracle of color is upon the screen, it proves even more fascinating when one steps "behind the scenes". The new, novel equipment in use, the lights, and the cameras are fully described in this exclusive article.

The naturalness of color movies is largely dependent upon great quantities of light. This "broad" arc light serves for general illumination. About twenty-five lights such as this are needed for each color scene.

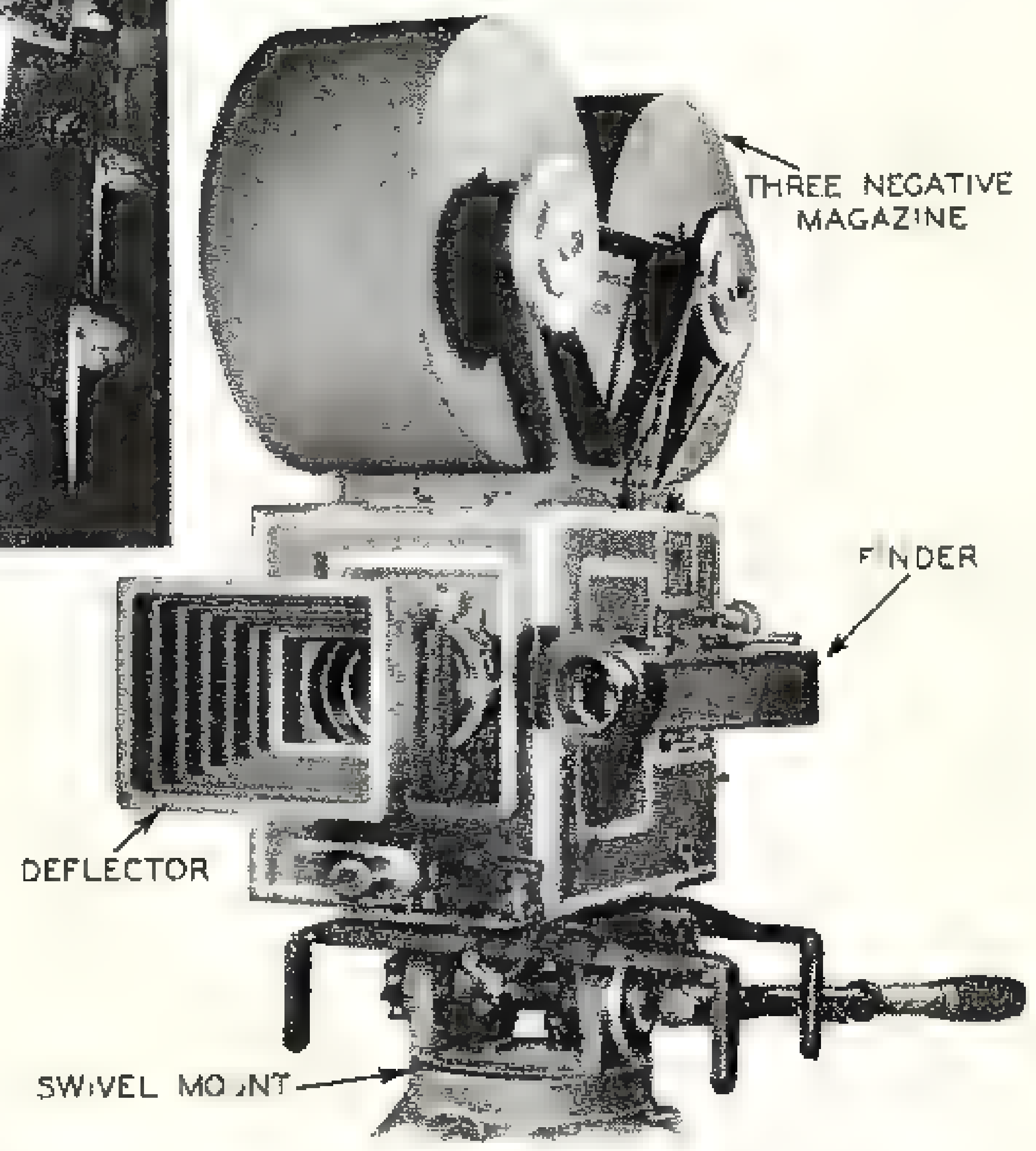
Charles Collins and Steffi Duna in an action scene for "Dancing Pirates", the latest indoor color film. Note the lights at top of set. Each one of which emits more than 250,000,000 candlepower.

Robert Jones, left, and Lloyd Corrigan, center, are the two men to whom credit must go for the success of "Dancing Pirates". Jones is color designer, and Corrigan the director.

From a "parallel" above the set the cameraman and his crew shoot a "high" scene. The microphone in the cameraman's hand is for broadcasting instructions during rehearsals.



In this "behind the scenes" photo of a color movie in the making one can see how the lights are arranged to shine with extra brilliance upon the gallows in the center. This immediately but unnoticeably attracts the eye to the center of action.



Here is a front view of the three-color Technicolor camera. In the magazine are three negatives side by side. One negative records red-orange, another blue-green, the third, yellow. A prism behind the single lens divides light rays into colors.

BEHIND the fascinating natural color motion pictures that are sweeping the country there lies a story of astonishing developments as spectacular in their field as the color movies themselves.

Let's visit the huge Stage 8 at United Artists where Pioneer Productions filmed a dance sequence for "Dancing Pirate," and observe the new mechanical equipment and new technique being employed in order to bring a color film to the screen that has coloring as vivid as nature herself.

Because everyone, even in Hollywood, is interested and curious about the equipment and methods employed in making color productions, a uniformed guard at the stage door stops the curious. Even the employees and actors of the studio who are working on other films would "gang-up" on the color setting and interfere with the work.

The first thing noticed that is different from the setting of black and white movie is the great number of lights used. Lighting equipment or "rigging" of great variety is everywhere. Overhead is a solid bank of "broads" which are used for the "filler" or overall illumination. High up on the "parallels," sixty feet up in the roof on the "catwalks," everywhere, on the top the setting and on the floor is lighting paraphernalia used for the special effects and for painting the desired scene. Two or three times more light is required in making a movie in color than one in black and white.

A new type of arc unit, called the "high-arc" has been developed for "Dancing Pirate" which emits 325,000,000 candlepower in a narrow beam. In order to illustrate the amount of heat given off, this arc, which draws 150 amps, if focussed to a narrow beam is capable of almost instantaneously setting a block of wood ablaze at a distance of twenty feet. Twenty-two of these powerful lights, besides fifty-six units of less capacity, were set up for the dance sequence. According to measurements, 16,000 amps were required for a daylight effect on this setting, or enough electricity to light an ordinary town of 10,000 or more inhabitants. It is enough power to illuminate several metropolitan city blocks with all the street signs and office lights. Eight to ten thousand amps, we are told by the "gaffer," the movie name for the electrician, were required on the same setting for a moonlight effect.

With the older type of "sun-arc" light used in earlier color pictures the eyes of the actors were fatigued and strained and gave what is known in the studios as "kleig-eyes," because of the presence of ultra-violet light. Now, on the new type "high-arc" a special glass filter which contains a metallic salt is used over the front of the light unit which absorbs the ultra-violet. This glass is also framed so it won't break from the heat and drop on the players, while the arc mechanism itself has a metallic insulator of cooling flanges which radiate off the heat.

A new lens, the "Morinc," is used on some

FOUND—*King Solomon's Gold* MINES

THE SECRET OF WAR-TORN ETHIOPIA *by* JAMES NEVIN MILLER

Deep in a smoldering volcano, dusky slaves still toil in the fabulously rich mines of Biblical days. Are they the reason behind Italy's Ethiopian war campaign?

Count Byron de Prorok (above), Europe's Roy Chapman Andrews, who found the lost gold mines of mighty King Solomon.

COUNT BYRON DE PROROK, famous explorer, is again back in the United States after a series of adventures that would make an Arabian Nights fable seem weak and colorless in comparison. He was successful in locating the exact spot where the legendary King Solomon of Biblical fame once mined fabulous tons of gold.

More important, and perhaps the reason for the Italian hosts pushing their way into Ethiopia, these ancient mines are being worked today on a scale that staggers the imagination. From a volcanic mountain top, de Prorok beheld countless slaves, both men and women, toiling night and day to uncover the heavy golden nuggets.

But let this distinguished archaeologist tell his own almost unbelievable story:

In the course of my numerous explorations in the interests of archaeology, I have found many ancient tombs and lost cities in Africa. Now I hoped to fulfill one of the major objectives of my career, the discovery of the original mines which supplied the fabulously wealthy monarchs of ancient times: Tut, Hannibal, Cleopatra, Alexander the Great, Solomon and the Queen of Sheba, with the vast supply of golden ornaments which made them famous.

For more than 15 years I have crisscrossed Africa's ancient caravan trails between Carthage and Utica, and from the Atlas to the Blue Nile in search of the origin of this lost gold. But without success. However, I had located many valuable clues, some of them passed down from generation to generation, others mere whispers gleaned from adventurers who had been foolhardy enough to penetrate into these mysterious interiors and later lose their lives.

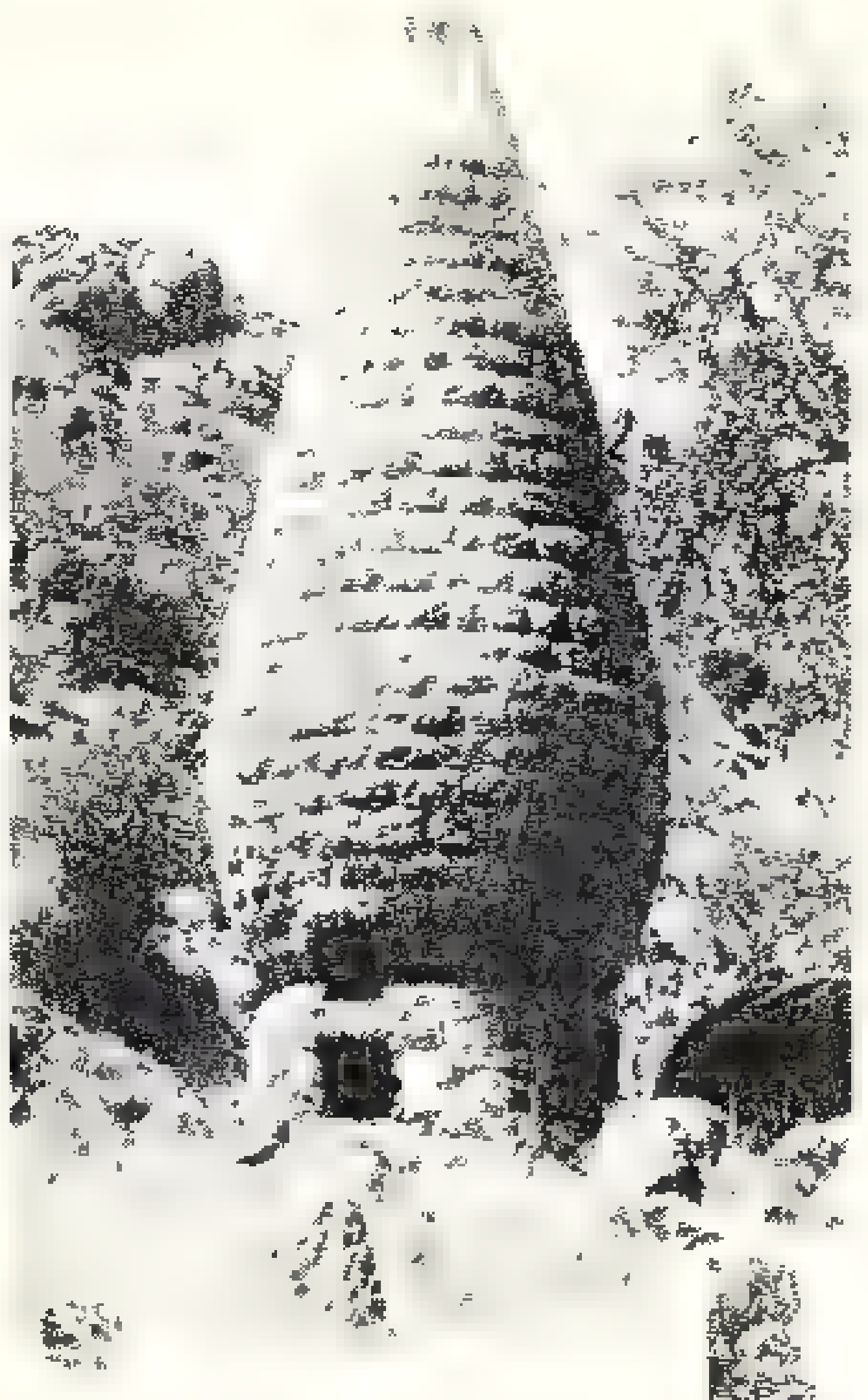
These clues convinced me that all trails led into the "back door" of Ethiopia, a remote western desert region ruled over by Solomon Ghogoli, a sultan who admits the supremacy of only one other ruler, Haile Selassie.

But an unforeseen difficulty presented itself: In order to penetrate the land of mystery we positively must have Haile Selassie's official permission, and in writing. Otherwise we would be certain victims of Sultan Ghogoli's murderous warriors.

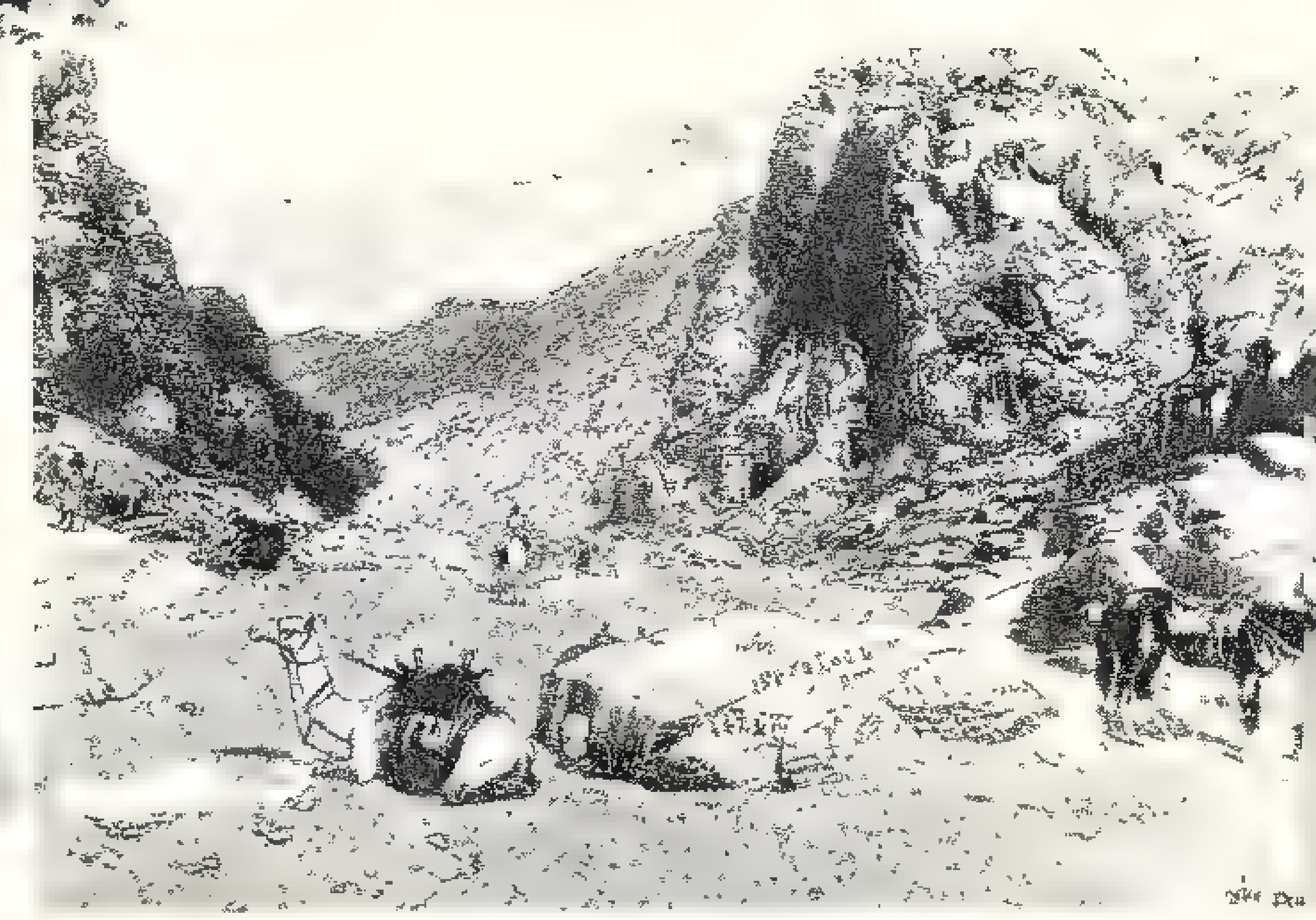
This was just before the Italo-Ethiopian war began. But even then Selassie must have foreseen the conflict because he was at that time so much occupied with military affairs that we found it next to impossible to see him. But finally, after endless formalities and diplomatic action, the Emperor gave us the first permission ever given to white men to explore the forbidden land of the Blue Nile.

After receiving the first official permit to cross the closed area of the British Sudan we reached Kumuk from Kaston by following the jungle-enclosed banks of the Blue Nile to where Selassie had promised us a military escort of 120. But at the desolate barrier we waited in vain.

Below—One of the untold thousands of dusky slaves who wash raw nuggets from the gold-ladened subterranean streams which flow under the almost extinct volcano.



One of the many tombs (above) of the long-dead consorts to Kings. Right—An actual sketch made by De Prorok showing the mines as they are today.



Their forefathers slaves to Cleopatra, today's Abyssinian "customs" men are really brigands. And Count de Prorok (mounted) is having border trouble, with his interpreter in loud and heated debate.

Through Country Forbidden to Hated White Men

De Prorok's party (left) have just been captured by Ghogoli's emissaries when the Count's cameramen took this shot, another of the exclusive pictures you see here. De Prorok is second from the extreme left, the man with the beard. When mad savages scrutinize you in this fashion, it is a question of keeping your head or losing it.

When the seasoned adventurer goes on safari, physical comforts are discarded, as shown by De Prorok's tent and personal necessities. But even these were dropped at the mines so that the porters could trek back with museum pieces.

Right here we made the mistake that almost cost us our lives. We decided to penetrate the interior in the hopes of meeting the escort there. This would have been a wise procedure if we had been properly supplied with official passports from the Emperor. Unfortunately the soldiers who were to bring them failed to show up, and we were so impatient to be on the move that we proceeded anyway.

So we headed straight for the Old Man of the Mountain, dread Solomon Ghogoli, Sultan of the Shangul. He was over 100 years old, maintained many wives and was, it was rumored, the owner of secret gold mines which no white man had ever seen. Never was he known to permit a European or American to visit his vast, savage realm.

For three terrible days we trekked across the enormous canyons and great mountains of this legendary land. Even in the shade our thermometers registered from 140 to 160 degrees Fahrenheit, so much greater than the heat of the human body that we were actually able to cool our hands by clamping them under our armpits. The merciless heat once reached 167 degrees, three-fourths as hot as boiling water.

Our porters were terror-stricken. They were fearful of being caught and killed by the savage sultan. No wonder many of them deserted.

This picture shows Sultan Ghogoli's warriors taking the Count into camp with the intention of holding him for ransom, making him a slave, or murdering him and salvaging his head.

On the fourth day we made a fantastic discovery. While daytime camping in a jungle with my companions I suggested we climb a great mountain about two miles from our camp. We did so and found its approximate center was the huge crater of a smoldering volcano. Aided by powerful binoculars from the heights on the far side we saw, a thousand feet below, a weird sight: untold thousands of black slaves, both men and women, working feverishly in the subterranean river bed.

Smoking Volcano Hides King Solomon's Mines

Amazed, I asked our guide, Diressa, "What on earth are they doing?"

He warned "Come away, master! They are Ghogoli's slaves, washing out gold." The sight excited us, and soon we tumbled and slid down there. For the skeptical minded, let me add that our movie cameras took in the entire astounding spectacle. Some of those nuggets were as big as a man's fist.

While the cameras were grinding away, my fellow scientists and I explored the rocks of the nearest canyons and found ancient hieroglyphics and rock drawings on the entrances of many of the abandoned mine shafts.

Our excitement knew no bounds. By purest chance we had achieved the major objective of our expedition. Think of it! We had found the precise spot where King Solomon of Biblical fame mined the gold that provided his court with unparalleled luxuries! Was there much gold here? There must have been untold tons of it, and the precious metal was being panned in the same crude way as practiced in Bible times.

Yes, these mounds and the rock markings told us the story students of archaeology had been seeking in vain to find ever since the mines were lost.

We were highly successful in bribing the guards with the aid of Ethiopian money, to permit us to look at some of the tombs. Which may sound strange—our "buying them" in this fashion, since they were handling such vast quantities of raw gold. But if a guard was caught with virgin gold in his possession he was executed or mutilated. But any actual money was not disturbed.

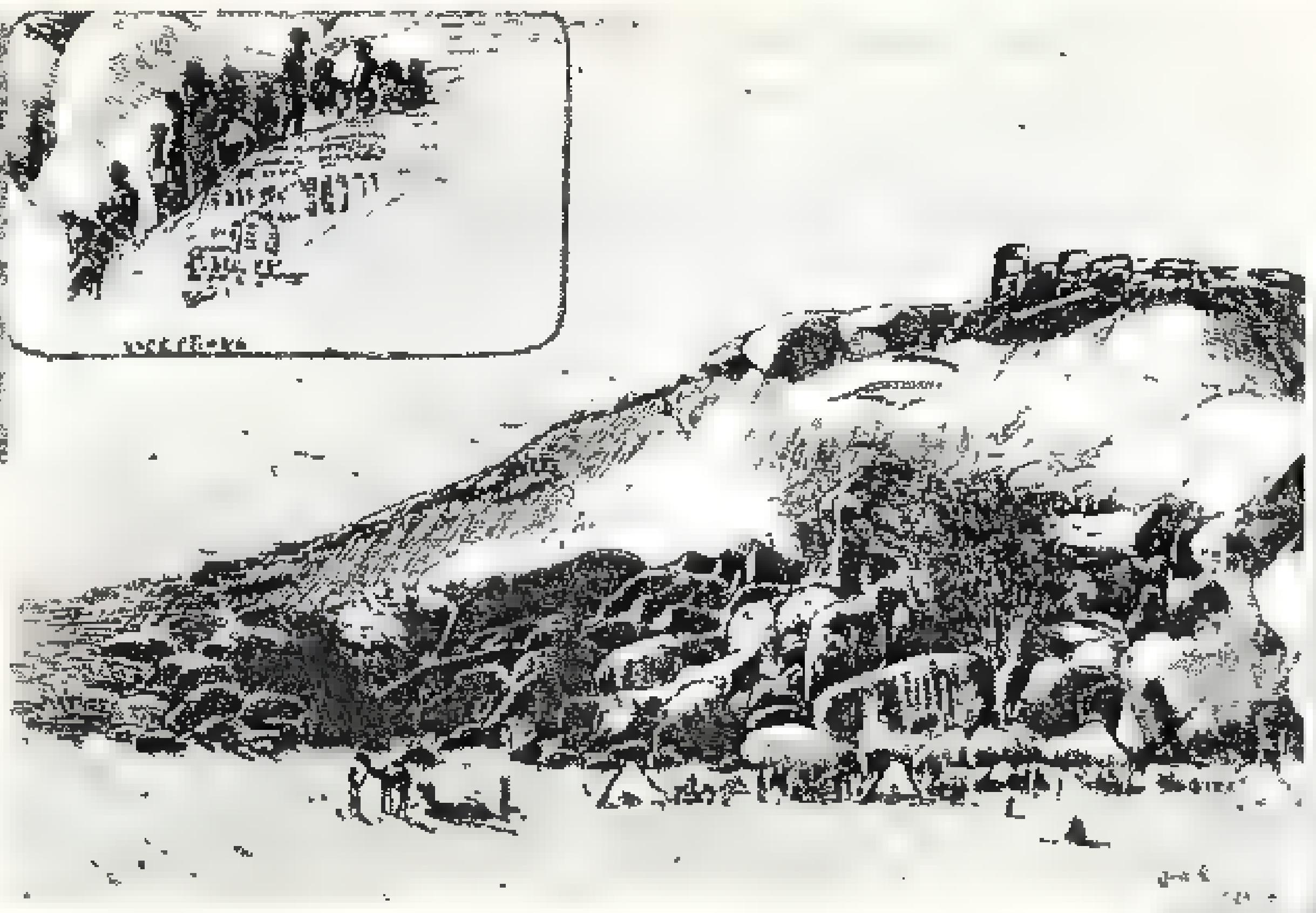
Then we heard the booming of giant tom-toms telegraphing messages to Ghogoli in his stronghold 50 miles away. His sacred territory was being invaded by members of the races he despised more than anything else in the world. And here in the mines danger lurked everywhere. The blazing heat was all but unbearable and the guards looked murderous.

Nevertheless, we started digging into the tombs and worked all that night and through the next day. But at dusk the tom-toms began to boom again. Time was short. We knew we must act with the greatest speed, and instantly.

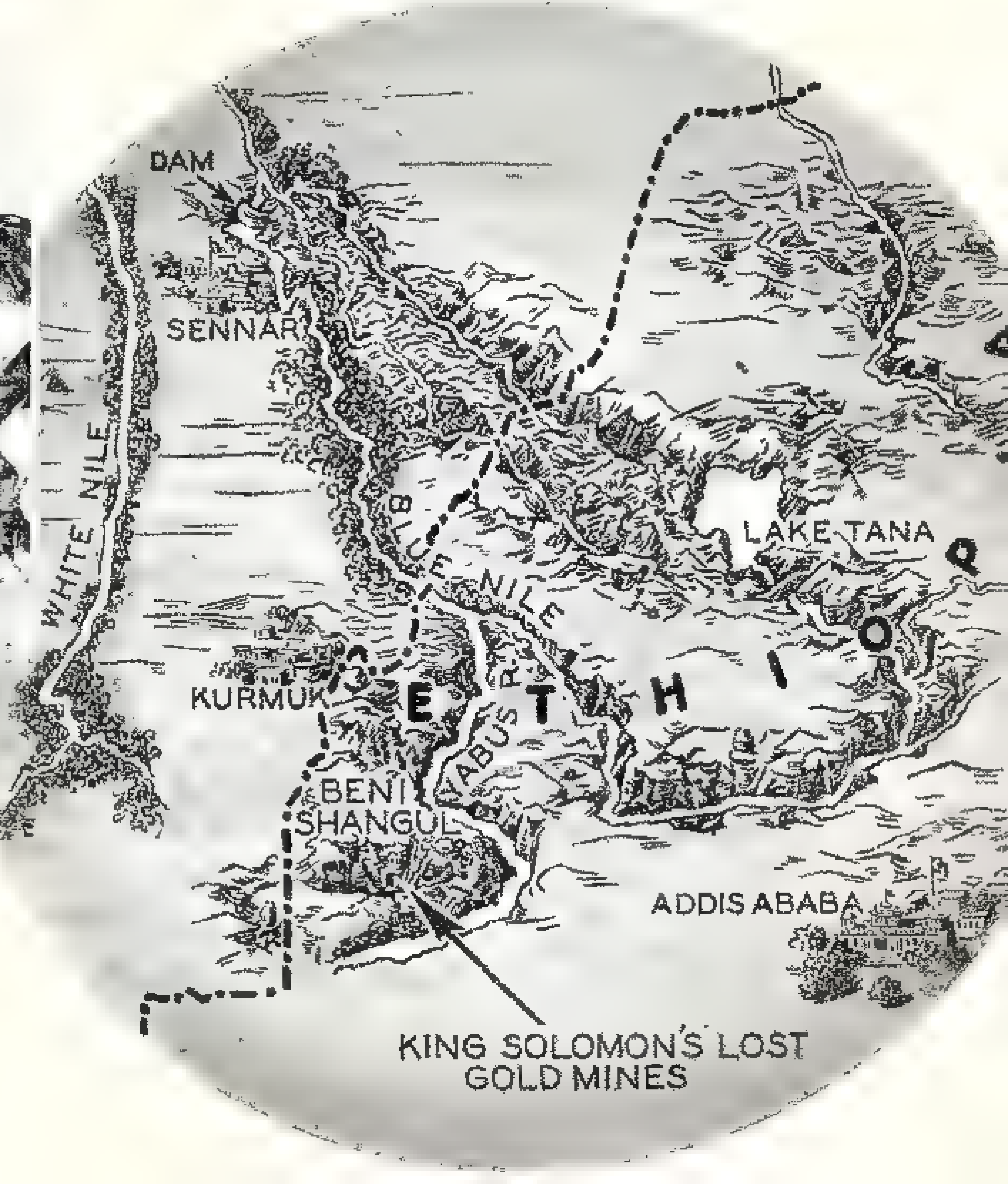
Hastily we packed up our specimens and started on a race for the Yabus River and safety, and three days later, utterly exhausted, we reached Albi Moti, the nearest Ethiopian village, praying that the promised military escort was there awaiting us with our official passports. But it was not.

We camped on a hill near the village, and as if by magic suddenly found ourselves

[*Continued on page* 141]

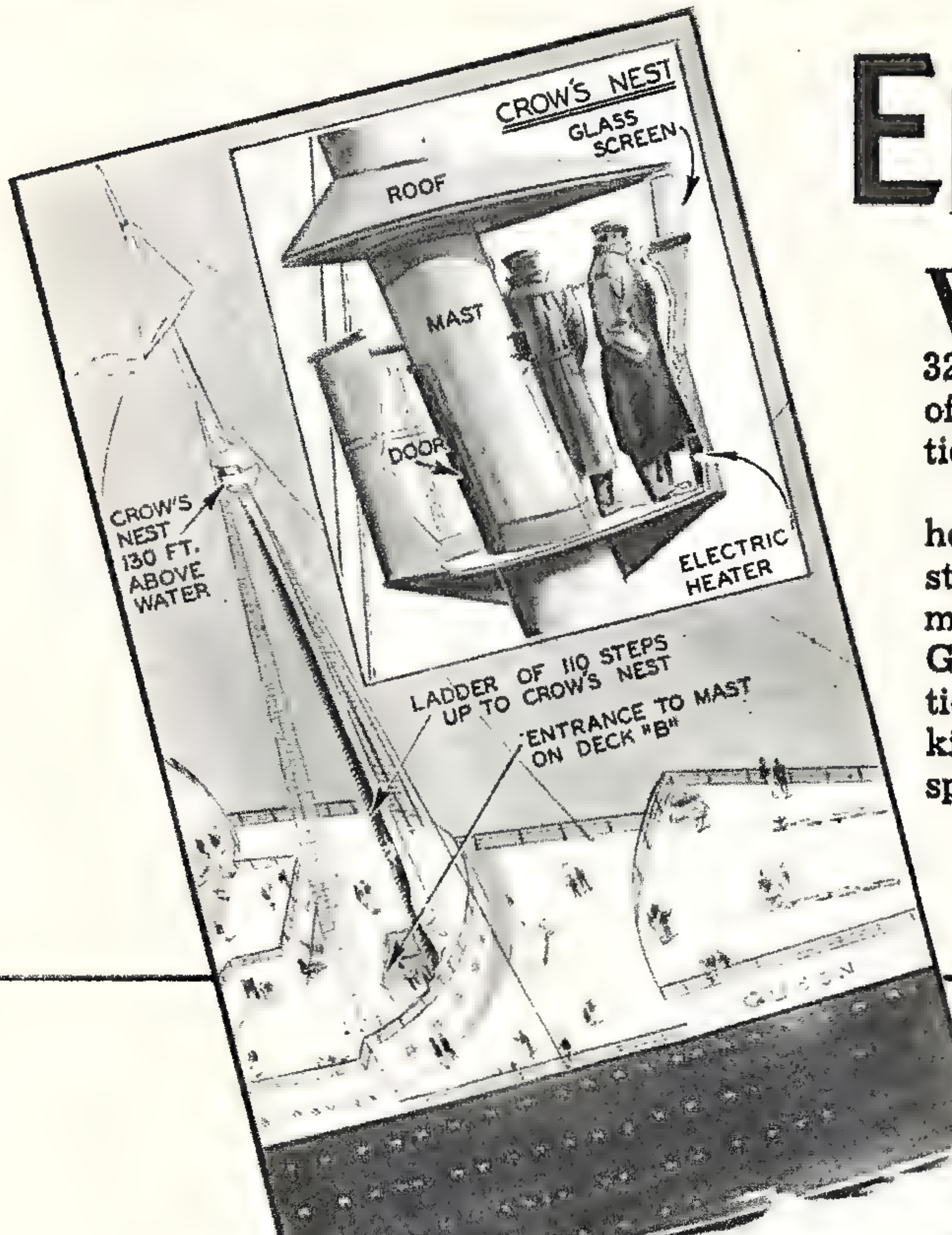


Photographs of King Solomon's mines are today aiding the drafting of another exploration trip into this same territory, and so cannot be released to public gaze, but here are De Prorok's authentic drawings of the mines.



The map at the right shows the probable location of King Solomon's mines. But if you intend going there, banish the thought. For when you are camped out there on the veldt and the tom-toms beat, all the gold in the world wouldn't buy your chance for life.

86TH FLOOR
QUEEN MARY
1018 FT
EMPIRE STATE BLDG
ACROSS THE ATLANTIC IN 4 DAYS
5 SATURDAY
6 SUNDAY
7 MONDAY
8 TUESDAY
180 FT. HEIGHT
THE WORLDS LARGEST DINING ROOM 160 FT. LONG 118 FT. WIDE 30 FT. HIGH
EACH FUNNEL LARGER IN DIAMETER THAN HUDSON TUNNEL
70 FT
CROW'S NEST ELECTRICALLY HEATED
COMPLETE DUPLICATION OF STEERING GEAR
40 MILES OF FREIGHT CARS TO HAUL HER WEIGHT
EACH ANCHOR WEIGHS AS MUCH AS 12 MOTOR CARS
QUEEN MARY
1004 FT. W.L.
1004 FT. WATER LINE
RUDDER WEIGHT 140 TONS
EACH PROPELLER 35 TONS
50 000 HP. PER PROPELLER SHAFT
200.000 HP. ENGINES RUBBER CUSHIONED
4-MAIN TURBINES CAN BE OPERATED INDEPENDENTLY
SPACE BETWEEN INNER AND OUTER BOTTOMS WILL PERMIT MAN TO WALK ERECT


CROW'S NEST
GLASS SCREEN
ROOF
MAST
DOOR
ELECTRIC HEATER
CROW'S NEST 130 FT. ABOVE WATER
LADDER OF 110 STEPS UP TO CROW'S NEST
ENTRANCE TO MAST ON DECK "B"
QUEEN

To reach the crow's nest (above), the lookouts must climb 110 iron rungs inside the hollow steel foremast. For the first time in any ship the crow's nest is elaborately fitted with modern devices. There are telephonic connections to the bridge below, and in addition to the glass weather screens, electric heaters keep the lookouts warm in winter.

ENGLAND'S WONDER GIANT PUTS TO SEA

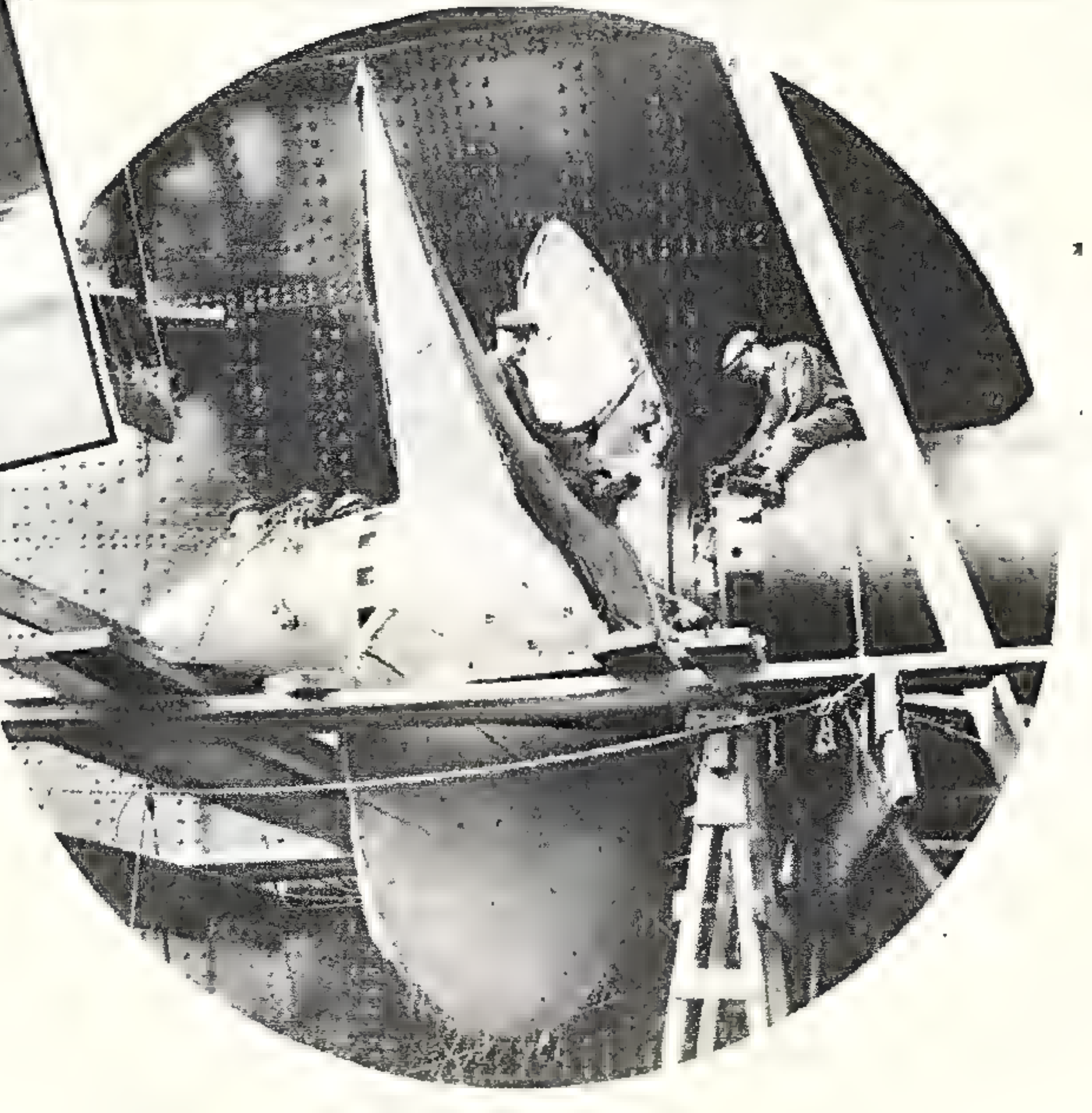
WHEN England's giant liner, the *Queen Mary* drops her anchors at quarantine, 32 tons of steel will grapple the mud bottom of New York Bay and swing her against the tide on 145 tons of massive steel chain.

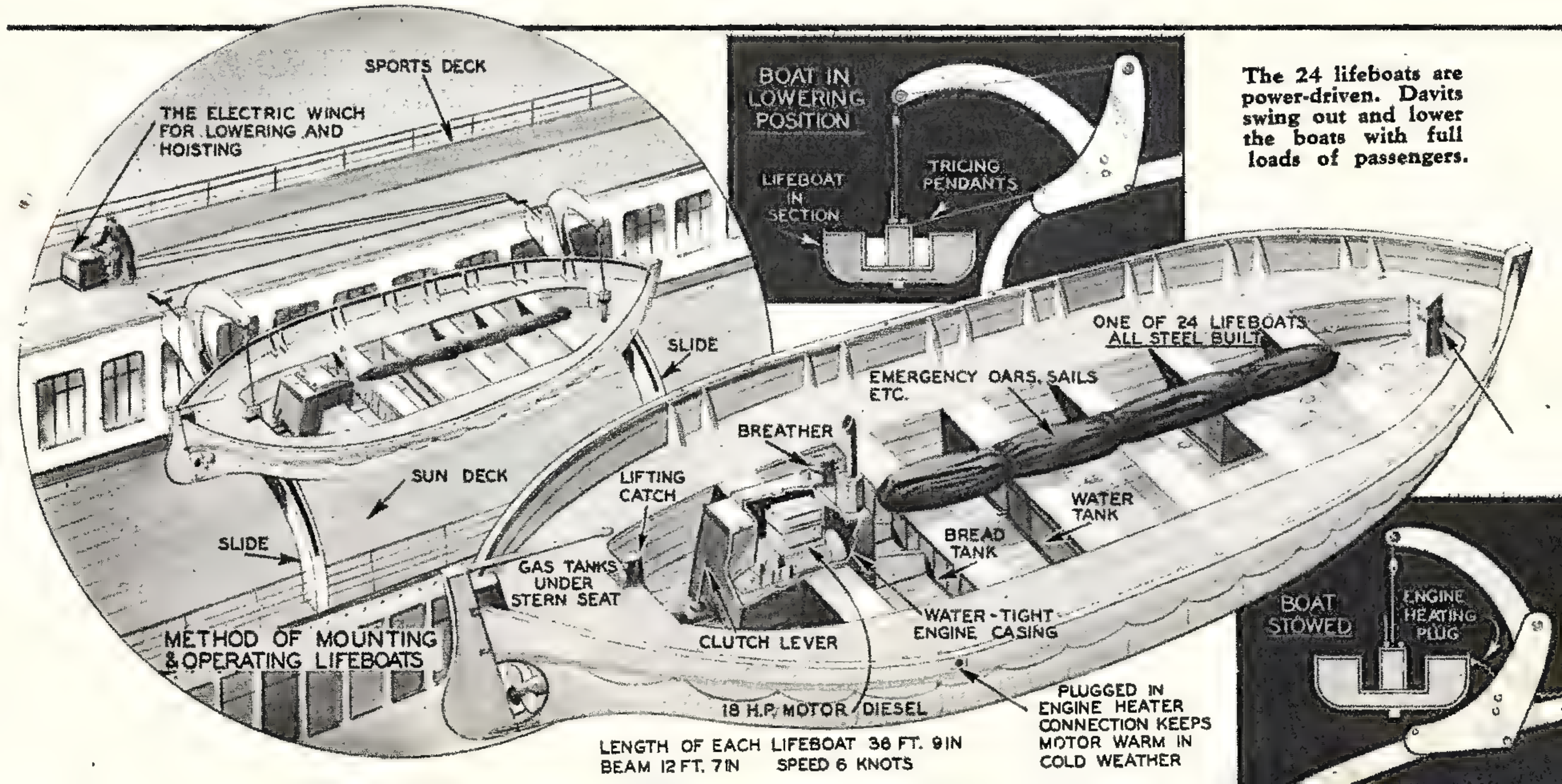
Captain Sir Edgar Britton, commanding her, says she is a "good sound job." But what strikes one most is the loveliness of her immense presence. For she is a great lady, Glasgow born and bred to follow the traditions of her ancestry—safety, comfort, sea-kindliness, regular arrival and departure, and speed. As speed queen hostess to 3,500 persons, passengers and crew, she has the most powerful engines afloat, cushioned as in an automobile, with the engine room "sprung" to eliminate the least vibration. Her single reduction geared turbines develop 200,000 horsepower and operate four 35-ton propellers. She is 1,018 feet long, 118 feet wide, 135 feet high from her keel to the top of her superstructure, and she displaces 83,000 tons of sea water.

Should her double hull, in which a man can walk erect, be punctured, any one or all of 37 watertight bulkheads would close. Her 24 all-steel unsinkable lifeboats carry 145 passengers each. There are 30,000 electric lights to give her illumination, 50 miles of plumbing, 21 elevators, special garages, a shopping center, gymnasium, cafes, lounges and even a kennel deck for dogs.

Strength, sea-kindliness and ease of movement through rough water are built into *Queen Mary's* knife-edge bow and all underwater "streamlining," to keep her steady on the rough North Atlantic and stifle the pounding of the tremendous following seas of the eastern passage.

And if you tune in Singing Sam's deep bass final note of "Asleep In The Deep," you will have an excellent idea of how the ship's sirens sound. The deep, soft, far-carrying




SPORTS DECK
THE ELECTRIC WINCH FOR LOWERING AND HOISTING
SLIDE
SUN DECK
SLIDE
METHOD OF MOUNTING & OPERATING LIFEBOATS
BOAT IN LOWERING POSITION
LIFEBOAT IN SECTION
TRICING PENDANTS
ONE OF 24 LIFEBOATS ALL STEEL BUILT
EMERGENCY OARS, SAILS ETC.
BREATHER
LIFTING CATCH
WATER TANK
BREAD TANK
GAS TANKS UNDER STERN SEAT
WATER-TIGHT ENGINE CASING
CLUTCH LEVER
18 H.P. MOTOR DIESEL
PLUGGED IN ENGINE HEATER CONNECTION KEEPS MOTOR WARM IN COLD WEATHER
LENGTH OF EACH LIFEBOAT 36 FT. 9IN
BEAM 12 FT. 7IN SPEED 6 KNOTS
BOAT STOWED
ENGINE HEATING PLUG

The 24 lifeboats are power-driven. Davits swing out and lower the boats with full loads of passengers.

Hidden HAZARDS *of* CIRCUS THRILLERS

by TOM MURRAY

Circus performers are trained from infancy. These skilled high wire artists are still in their early teens.

Photos at right copyright by Ringling Bros. Barnum & Bailey

LILLIAN LEITZEL, the world's greatest lady aerialist, had just finished her 100th muscle grind in the high dome of a Copenhagen theater and the huge crowd of spectators were applauding loudly. Suddenly hundreds of eyes saw a slim graceful form plunging downward. The fall was not a part of the woman's act. She had fallen to her death. "Crystalization" had weakened a swivel in her rigging, and once again this mysterious deterioration of steel had claimed another circus performer; this time one of the best and most loved artists of the sawdust arena.

Science has been unable to cope with this steel granulation and every season one or more circus performer plunges to his or her death beneath the white tops.

Next to the demon crystalization the biggest problem confronting the circus performer, and upon which their lives depend, is perfection in mechanical construction of their various riggings from which they perform their many dangerous feats. Every bar, swivel, guy wire and metal connection must be absolutely accurate in detail and perfect in construction. Hidden defects must be avoided in every piece of mechanism if the man on the flying trapeze is to survive from season to season.

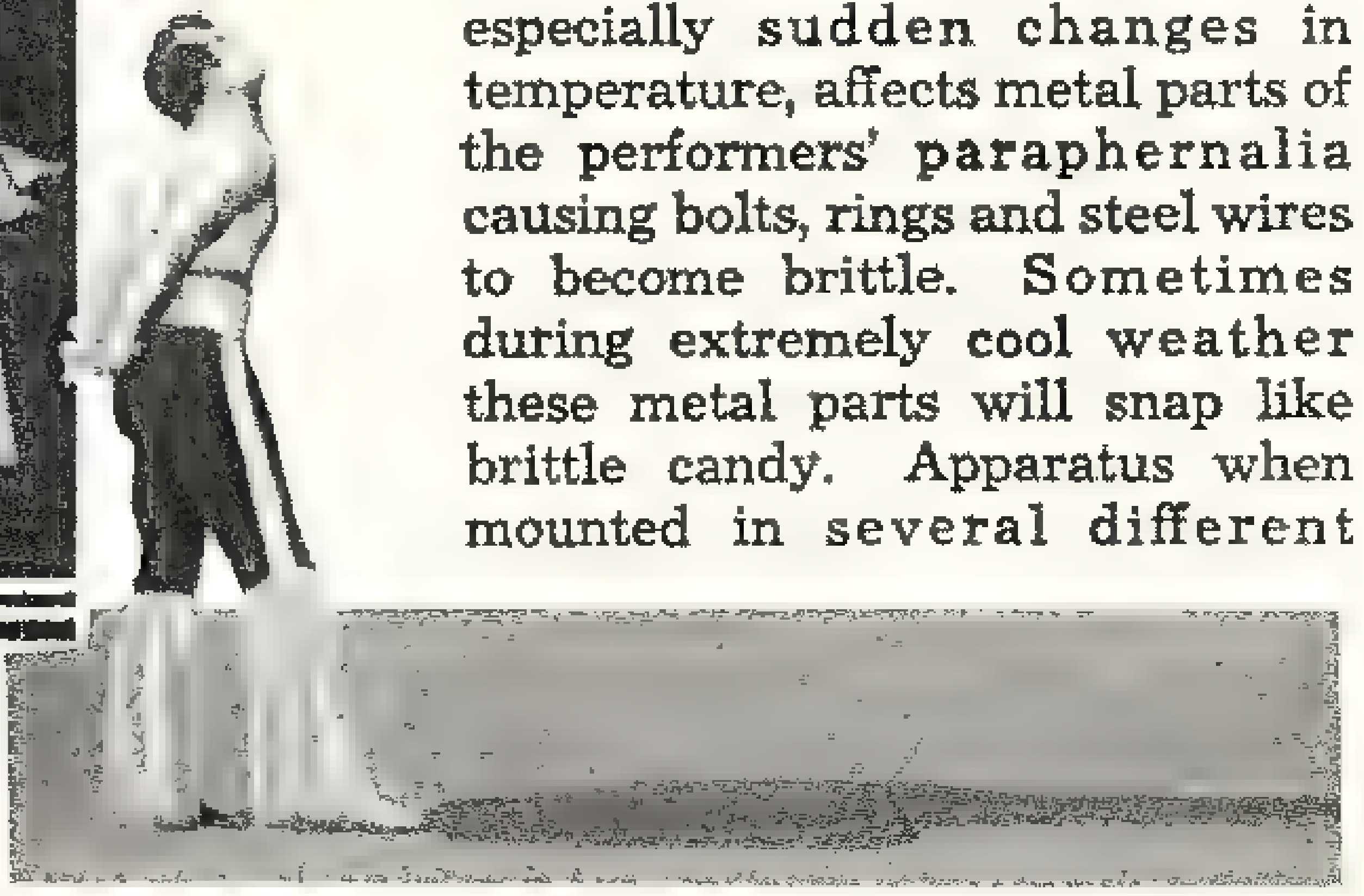
Many of the circus performers' accidents are unavoidable, others could be avoided. Weather conditions, especially sudden changes in temperature, affects metal parts of the performers' paraphernalia causing bolts, rings and steel wires to become brittle. Sometimes during extremely cool weather these metal parts will snap like brittle candy. Apparatus when mounted in several different directions from a single ring or other fastening will, at times, create an uneven pressure causing the fastening to snap. This has happened in Madison Square Garden, New York City, where several riggings must be guyed from the same fastenings or ring anchors.

As the circus moves from a low altitude to higher country, the aerialist and acrobats must be on the alert to the lightness of the air or they will over-shoot their marks. In high altitudes leaps and turns can be made with less effort than in low altitudes.

Many of the leading circus performers make their own performing equipment, designing it and then creating it in every mechanical detail. Mechanical perfection, in many cases, is lacking. In some instances bolts and hooks are made too small and not strictly uniform. Inefficient mechanics who do not understand the proper details in constructing metal aerial equipment, are often responsible for accidents beneath the white tops.

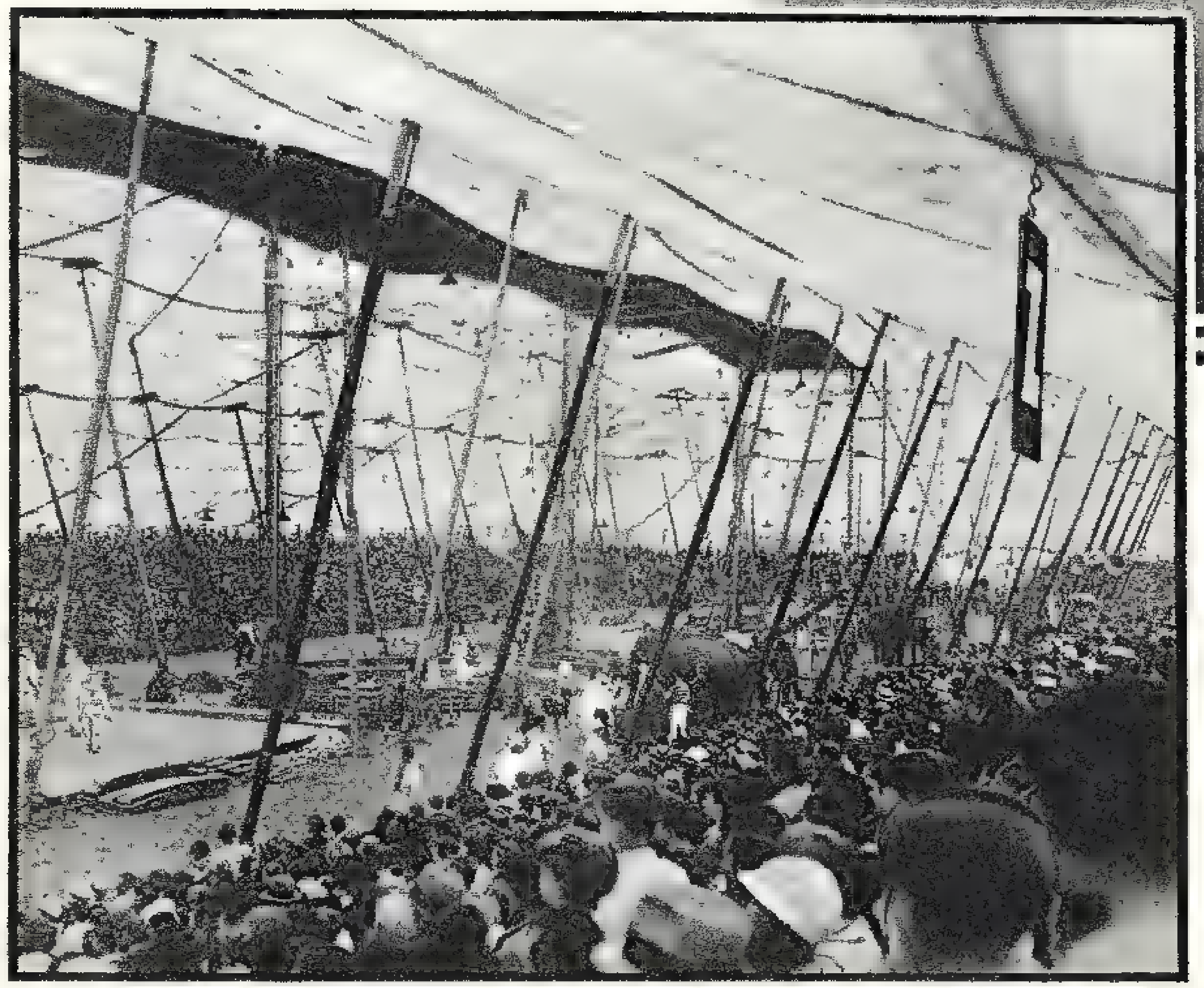
There are several professional manufacturers of apparatus for circus performers who cater exclusively to this type of business.

[*Continued on page* 131]



Above—The lives of these artists rests on a small metal swivel. Should this snap they would be hurled to their doom on the sawdust ring fifty feet below. Right—The Walkmir Troupe take their lives in their own hands to present this daring feat of juggling.

The success of the human cannon ball stunt was largely due to the mechanical genius of the elder Zacchini, an Italian mining engineer. His five sons have been performing this amazing act throughout the world.



Photos copyright by Ringling Bros. Barnum & Bailey

Here in the world's largest tent several score of experienced aerial riggers are constantly on the alert for faulty bars.

Win a Soapbox RACING CAR!

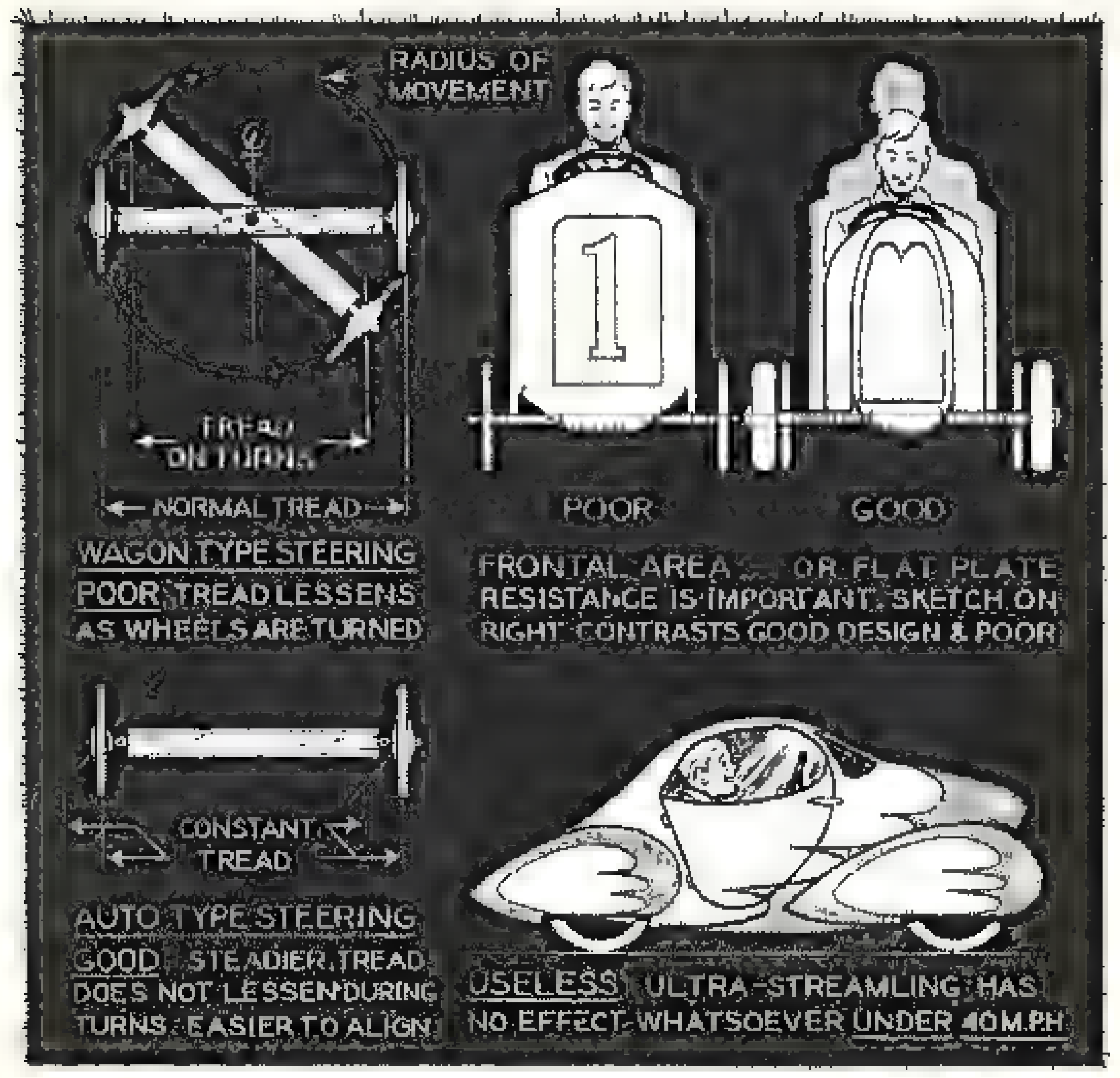
Full speed ahead in an MM Soap Box Racer! This "trike" wheeled speedster is second prize in the contest.

THE PRIZES

First Prize—A scientifically designed Soap Box Racer, complete with Doenut tired wheels.

Second Prize—A Soap Box Racer of same design as above, complete with ball-bearing tricycle wheels.

Third Prize—A set of four Musselman Doenut tired wheels.


RADIUS OF MOVEMENT
TREAD ON TURNS
NORMAL TREAD
WAGON TYPE STEERING POOR: TREAD LESSENS AS WHEELS ARE TURNED
1
POOR
GOOD
FRONTAL AREA OR FLAT PLATE RESISTANCE IS IMPORTANT. SKETCH ON RIGHT CONTRASTS GOOD DESIGN & POOR
CONSTANT TREAD
AUTO TYPE STEERING GOOD: STEADIER, TREAD DOES NOT LESSEN DURING TURNS. EASIER TO ALIGN
USELESS: ULTRA-STREAMLING HAS NO EFFECT WHATSOEVER UNDER 40 M.P.H.

There is a right and wrong to everything, including soap box racers. Right, in this case, means increased speed and victory.

THE RULES

1. From the letters contained in the three words "Hobbies and Inventions" make as many words as possible. No other letters can be used. List all words in alphabetical order using pen and ink or a typewriter. Neatness will be considered by the judges, but elaborate entries will not influence their decisions.
2. Proper names, foreign words, and slang do not count.
3. In fifty words or less write a letter describing the article you like best in this issue, and what type of article you would like to see most in a future issue.
4. Write your name and address plainly on your entry. No entries will be returned.
5. Webster's New International Dictionary will be used as reference in cases of disputed words.
6. The editors of this magazine will be the judges. Their decisions are final.
7. This contest is open to everyone except employees of Modern Mechanix Publishing Co. and their families.
8. You don't have to buy a copy of this magazine or be a subscriber to enter the contest.
9. Mail your entry to the Soap Box Derby Contest Editor, Modern Mechanix Publishing Co., Greenwich, Conn. Entries for the contest must be postmarked on or before June 24, 1936.

TWO Soap Box Racers! A set of Musselman doenut tired wheels! These are the three prizes in MM's Soap Box Racer contest. First prize is a scientifically designed racer, fully equipped with doenut tired wheels! Second prize is a racer of the same design, equipped with ball bearing tricycle wheels! And the third prize is a set of four Musselman doenut tires and wheels. The winning of one of these prizes will make you the envy of all the boys in the neighborhood, and will be sure to put you right up in the front ranks in the pushmobile speed contests.

To compete for one of these big prizes, all you have to do is write as many words as you can from the letters contained in three words "Hobbies and Inventions." Proper names, slang, or foreign words will not count. Then write a fifty-word letter or less describing the article you liked best in this issue and why, and what kind of an article you would like to see most in a future issue. Mail your letter and list of words to the Soap Box Derby Contest Editor, MODERN MECHANIX HOBBIES & INVENTIONS, Greenwich, Conn., before June 24. Readers submitting the most words and who fulfill other requirements listed in the rules will be awarded the prizes.

Soap Box Racers built on sound engineering principles will prove to be the winners in the Soap Box Derbies to be held all over the country this year. Gravity furnishes the power, but science must furnish the speed.

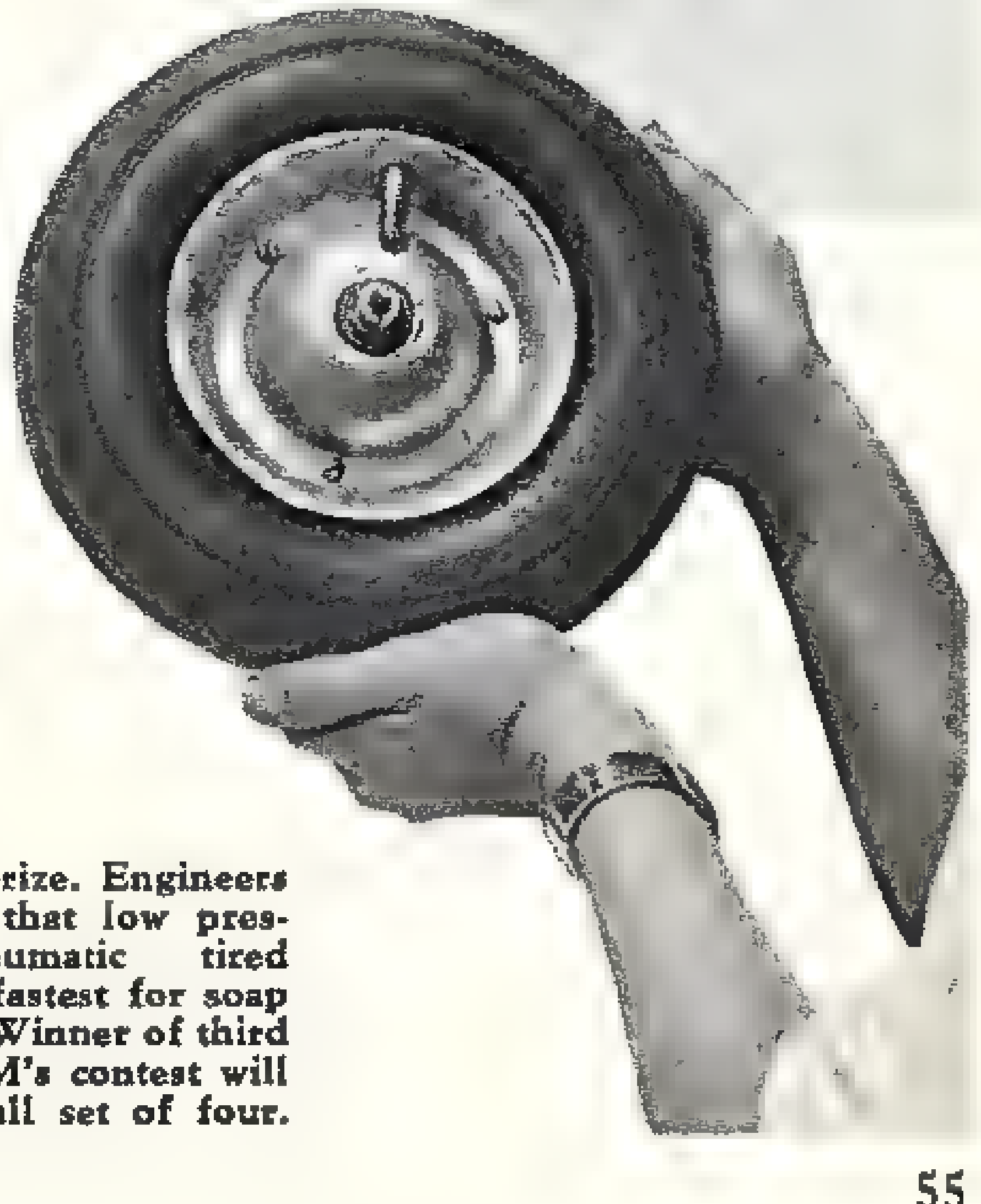
Naturally, the builder of the winning car will need to exercise considerable ingenuity in getting together his soap box derby entrant. It is with the idea of showing what has been done, and what can be done that this article is written.

All Derbies are rolling races. Pushing is not allowed. Consequently the car will have to be a good coaster before all else. This indicates ball bearings, perfect wheel alignment, perfect braking and smooth steering control.

Indicated also are a rather light weight, perfect load distribution approaching the ideal of weight equally divided on all four wheels, and as little wind resistance as possible. While the latter is not of much mo-

1st Prize!
MM

Here is the first prize in the MM Soap Box Racer Word Contest. This de luxe scientifically designed, doenut tired racer is finished in cream and navy blue color with cable brakes.



The third prize. Engineers are agreed that low pressure, pneumatic tired wheels are fastest for soap box racers. Winner of third place in MM's contest will receive a full set of four.

Small Details Decide Soap Box Derby Winners

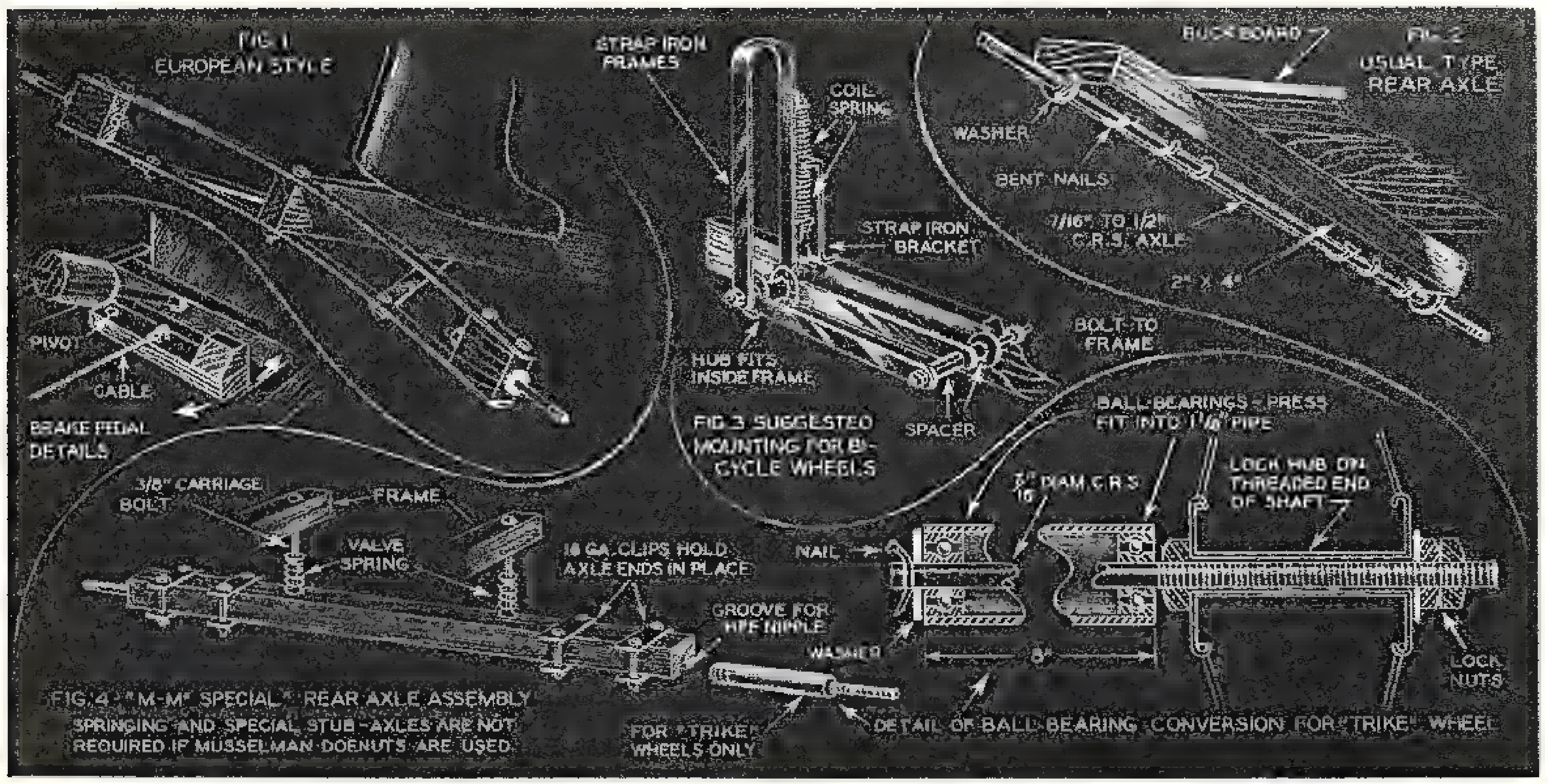
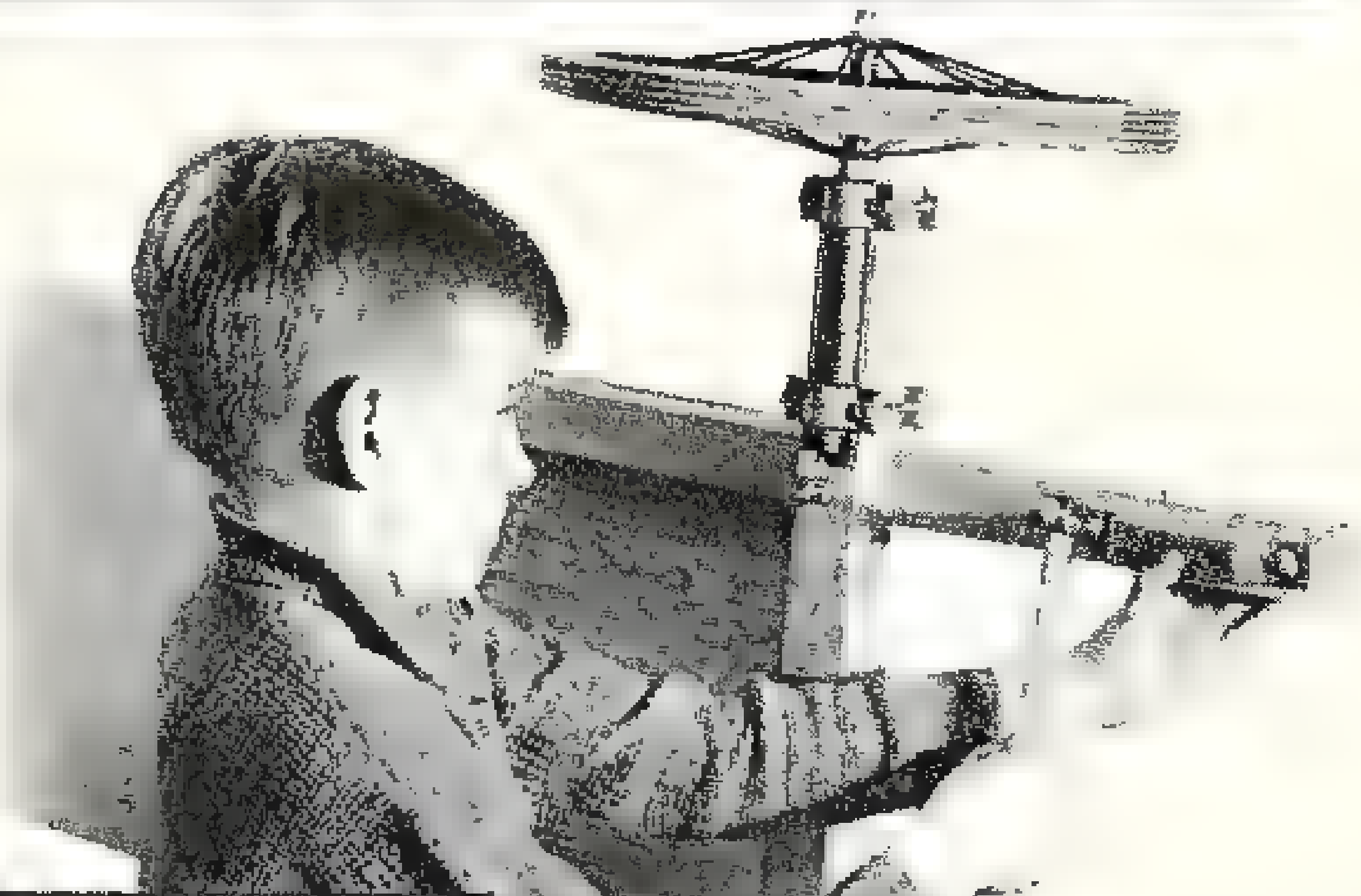


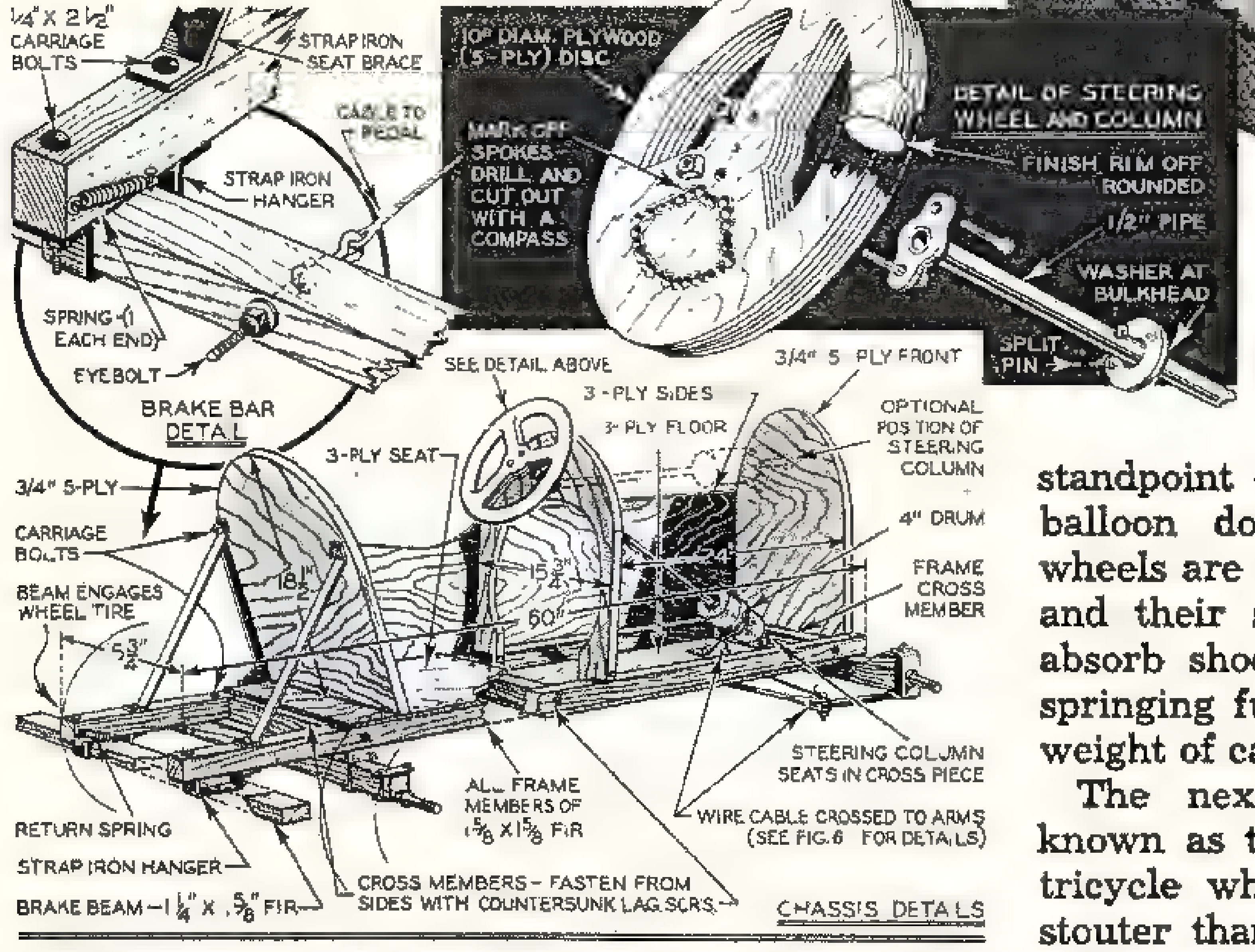
FIG. 1
EUROPEAN STYLE
PIVOT
CABLE
BRAKE PEDAL DETAILS
STRAP IRON FRAMES
COIL SPRING
STRAP IRON BRACKET
HUB FITS INSIDE FRAME
SPACER
BOLT TO FRAME
FIG. 3 SUGGESTED MOUNTING FOR BI-CYCLE WHEELS
BUCKBOARD
FIG. 2
USUAL TYPE REAR AXLE
WASHER
BENT NAILS
7/16" TO 1/2" C.R.S. AXLE
2" X 4"
3/8" CARRIAGE BOLT
FRAME
VALVE SPRING
18 GA. CLIPS HOLD AXLE ENDS IN PLACE
GROOVE FOR PIPE NIPPLE
WASHER
NAIL
BALL BEARINGS - PRESS FIT INTO 1 1/8" PIPE
7/16" DIAM. C.R.S.
LOCK HUB ON THREADED END OF SHAFT
8"
LOCK NUTS
FIG. 4 "M-M" SPECIAL REAR AXLE ASSEMBLY
SPRINGING AND SPECIAL STUB-AXLES ARE NOT REQUIRED IF MUSSELMAN DOENUTS ARE USED
FOR "TRIKE" WHEELS ONLY
DETAIL OF BALL BEARING CONVERSION FOR "TRIKE" WHEEL

ment it does mean that what is known as "flat plate resistance" should be held at a minimum. Streamlining is of no value at the speeds these cars travel.

To get all these desirable factors we start by looking over the wheels that are available. You can get baby buggy wheels from dumps and junk yards, but invariably they will be off-round in tread, of uneven diameters and will wobble in tracking.



Here a youthful builder is fastening down the brake beam carriage. Also is shown the way in which rear axle is housed in axle beam. Such an axle cannot get out of line.


1/4" X 2 1/2" CARRIAGE BOLTS
STRAP IRON SEAT BRACE
CABLE TO PEDAL
STRAP IRON HANGER
SPRING (1 EACH END)
EYEBOLT
BRAKE BAR DETAIL
10" DIAM. PLYWOOD (5-PLY) DISC
MARK OFF SPOKES DRILL AND CUT OUT WITH A COMPASS
DETAIL OF STEERING WHEEL AND COLUMN
FINISH RIM OFF ROUNDED
1/2" PIPE
WASHER AT BULKHEAD
SPLIT PIN
SEE DETAIL ABOVE
3-PLY SIDES
3-PLY FLOOR
3/4" 5-PLY FRONT
OPTIONAL POSITION OF STEERING COLUMN
4" DRUM
FRAME CROSS MEMBER
3-PLY SEAT
3/4" 5-PLY
CARRIAGE BOLTS
BEAM ENGAGES WHEEL TIRE
18 1/2"
15 3/4"
60"
5 3/4"
STEERING COLUMN SEATS IN CROSS PIECE
ALL FRAME MEMBERS OF 1 5/8 X 1 5/8 FIR
WIRE CABLE CROSSED TO ARMS (SEE FIG. 6 FOR DETAILS)
RETURN SPRING
STRAP IRON HANGER
BRAKE BEAM—1 1/4" X 5/8" FIR
CROSS MEMBERS—FASTEN FROM SIDES WITH COUNTERSUNK LAG SCRS.
CHASSIS DETAILS

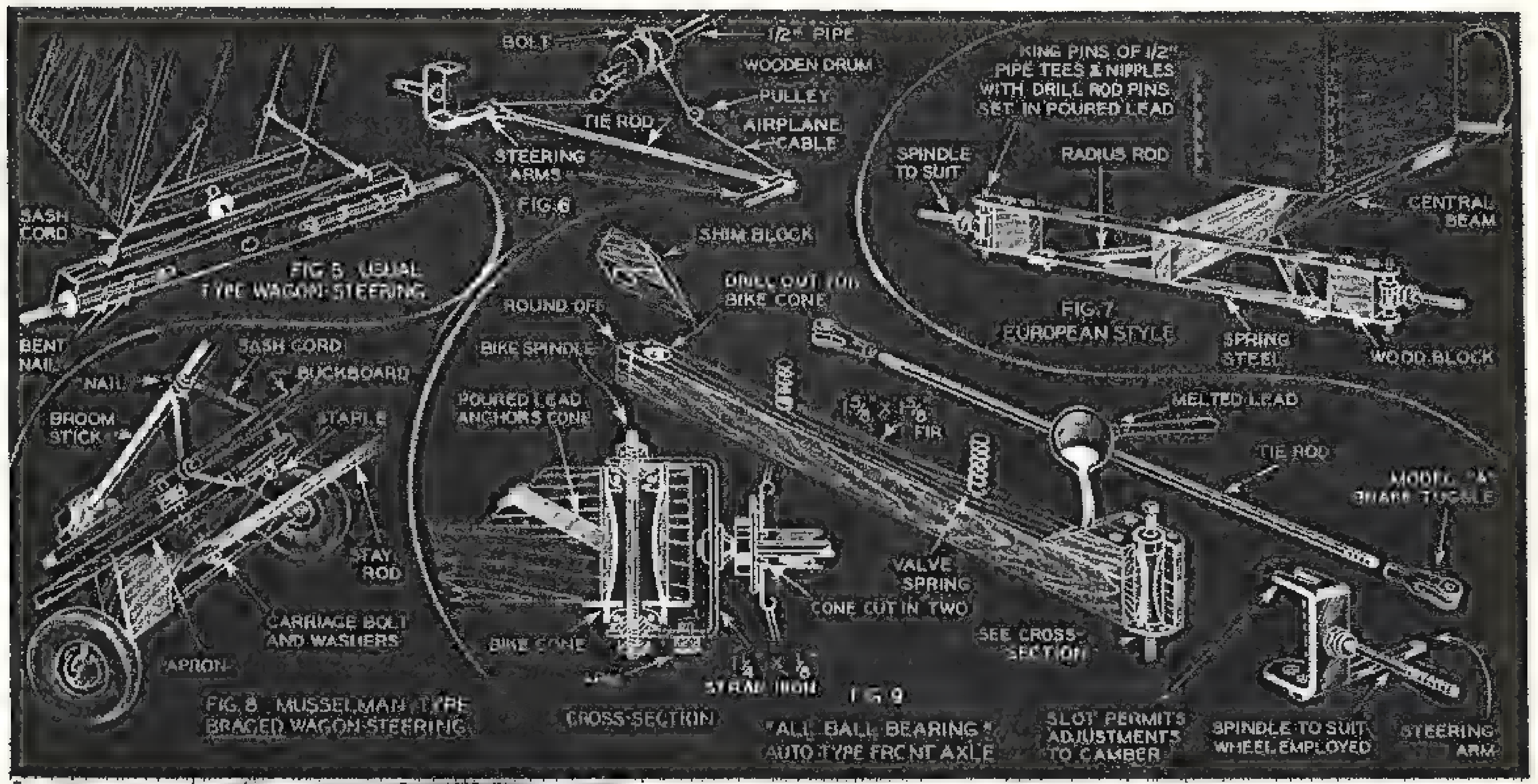
The chassis, together with steering and brake details are shown here. The steering wheel can be made of five-ply wood or two layers of three-ply. Fir is used for frames and three-ply wood for floor.

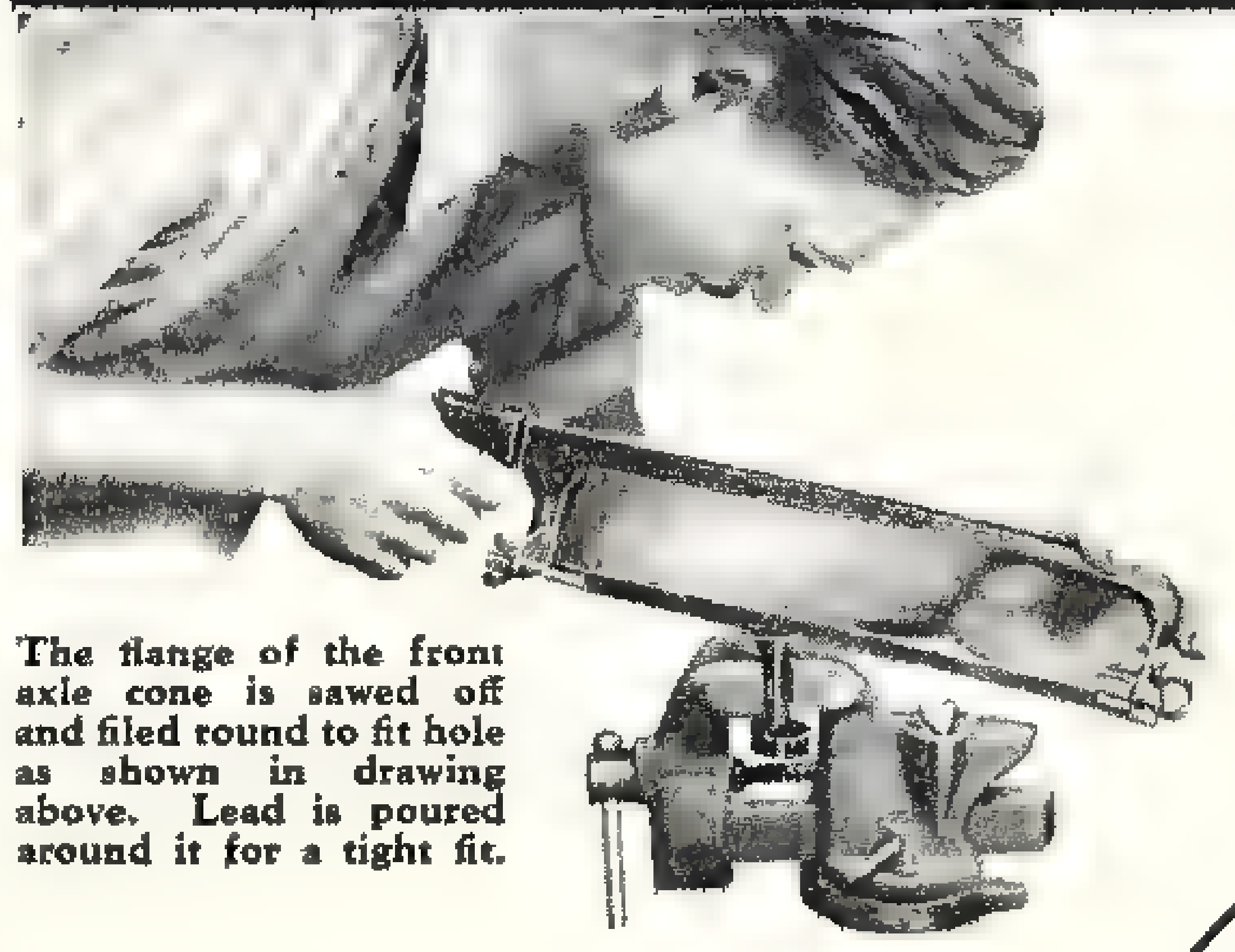
The best wheel from the standpoint of the derby builder is the balloon doenut tired wheel. These wheels are ball-bearing, easy to install, and their soft pneumatic nature will absorb shocks and do away with the springing function, making entire total weight of car practically sprung weight.

The next best thing is what is known as the 14″ diameter "trike" or tricycle wheel. This wheel is much stouter than the ordinary baby buggy wheel, and can be had in any cycle shop. Such a wheel wouldn't stand much of a chance of winning a national event with its flat, long greased bearing surface, so we must needs make it a ball-bearing job. This can be done, in the rear wheels, by threading the $\frac{7}{16}$″ cold rolled steel axle for a length that will accommodate the hub and locknuts. The wheel is bolted securely to the axle. The axle turns in ball bearings that are inserted in a pipe nipple. See Figure 4. These bearings are "trike" bearings, costing from 12 cents to 25 cents each. You will find you can insert them snugly in a 1⅛″ outside diameter water or gas pipe nipple. The end of the axle is washered and pinned. The nipple is set in a groove in a 1⅝″x1⅝″ fir axle (commonly called 2x2) and is retained by ⅛″x1¼″ strap iron clips bolted together as shown with s. a. e. auto bolts costing about 3 cents each, obtainable at auto supply houses. This assembly gives a stout wheel, of perfect align-

[Continued on page 132]

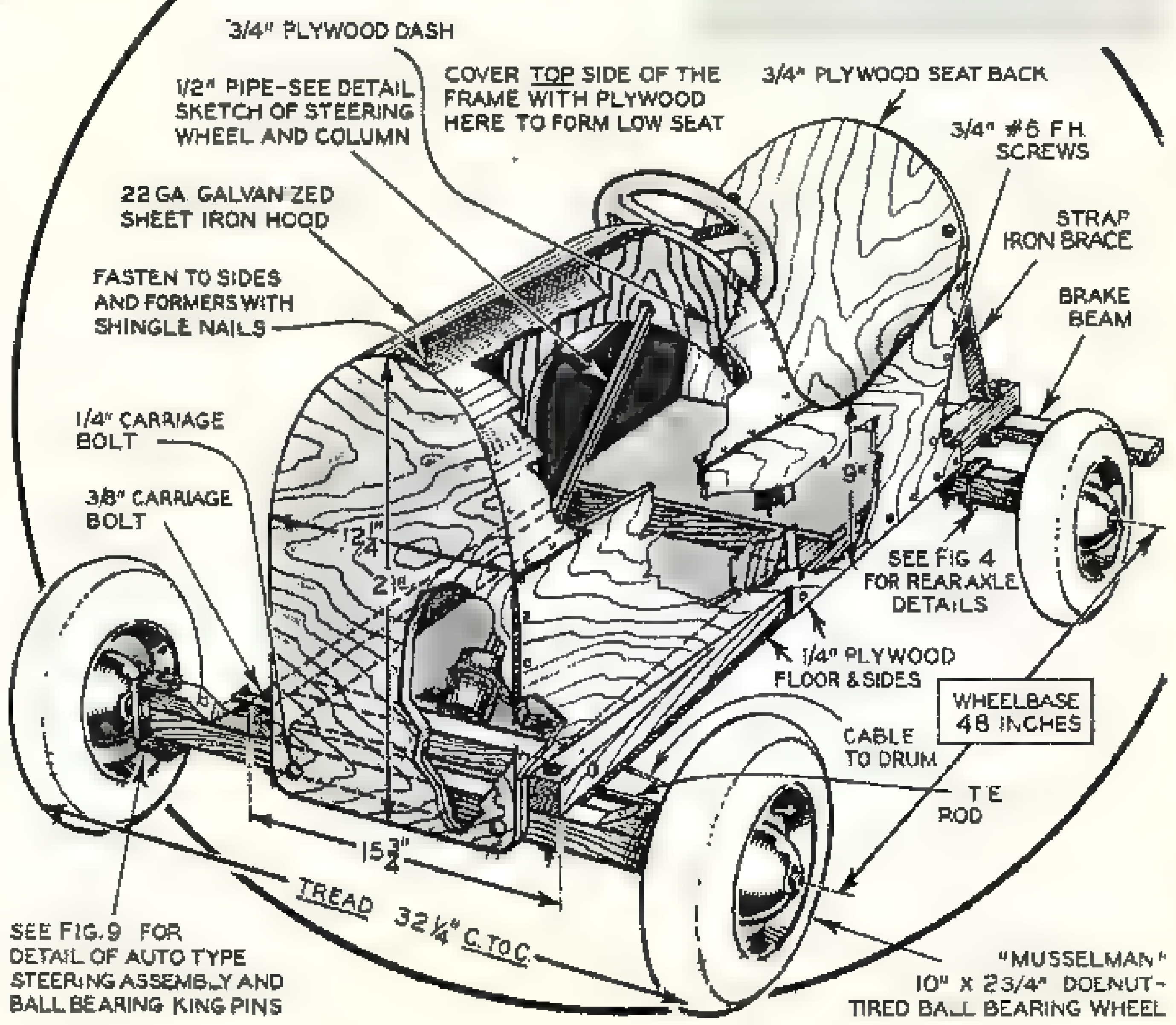
Drawings Show Strength, Speed of MM Racer


SASH CORD
FIG. 5 USUAL TYPE WAGON STEERING
BENT NAIL
BOLT
1/2" PIPE
WOODEN DRUM
PULLEY
AIRPLANE CABLE
TIE ROD
STEERING ARMS
FIG. 6
SHIM BLOCK
DRILL OUT FOR BIKE CONE
ROUND OFF
BIKE SPINDLE
POURED LEAD ANCHORS CONE
SASH CORD
BUCKBOARD
NAIL
BROOM STICK
STAPLE
STAY ROD
CARRIAGE BOLT AND WASHERS
APRON
FIG. 8 MUSSELMAN TYPE BRACED WAGON STEERING
BIKE CONE
CROSS-SECTION
1/4 X 1/8 STRAP IRON
CONE CUT IN TWO
VALVE SPRING
1 5/8 X 1 5/8 FIR
FIG. 9
"ALL BALL BEARING" AUTO TYPE FRONT AXLE
SEE CROSS-SECTION
SLOT PERMITS ADJUSTMENTS TO CAMBER
KING PINS OF 1/2" PIPE TEES & NIPPLES WITH DRILL ROD PINS SET IN POURED LEAD
SPINDLE TO SUIT
RADIUS ROD
CENTRAL BEAM
FIG. 7
EUROPEAN STYLE
SPRING STEEL
WOOD BLOCK
MELTED LEAD
TIE ROD
MODEL "A" BRAKE TOGGLE
SPINDLE TO SUIT WHEEL EMPLOYED
STEERING ARM



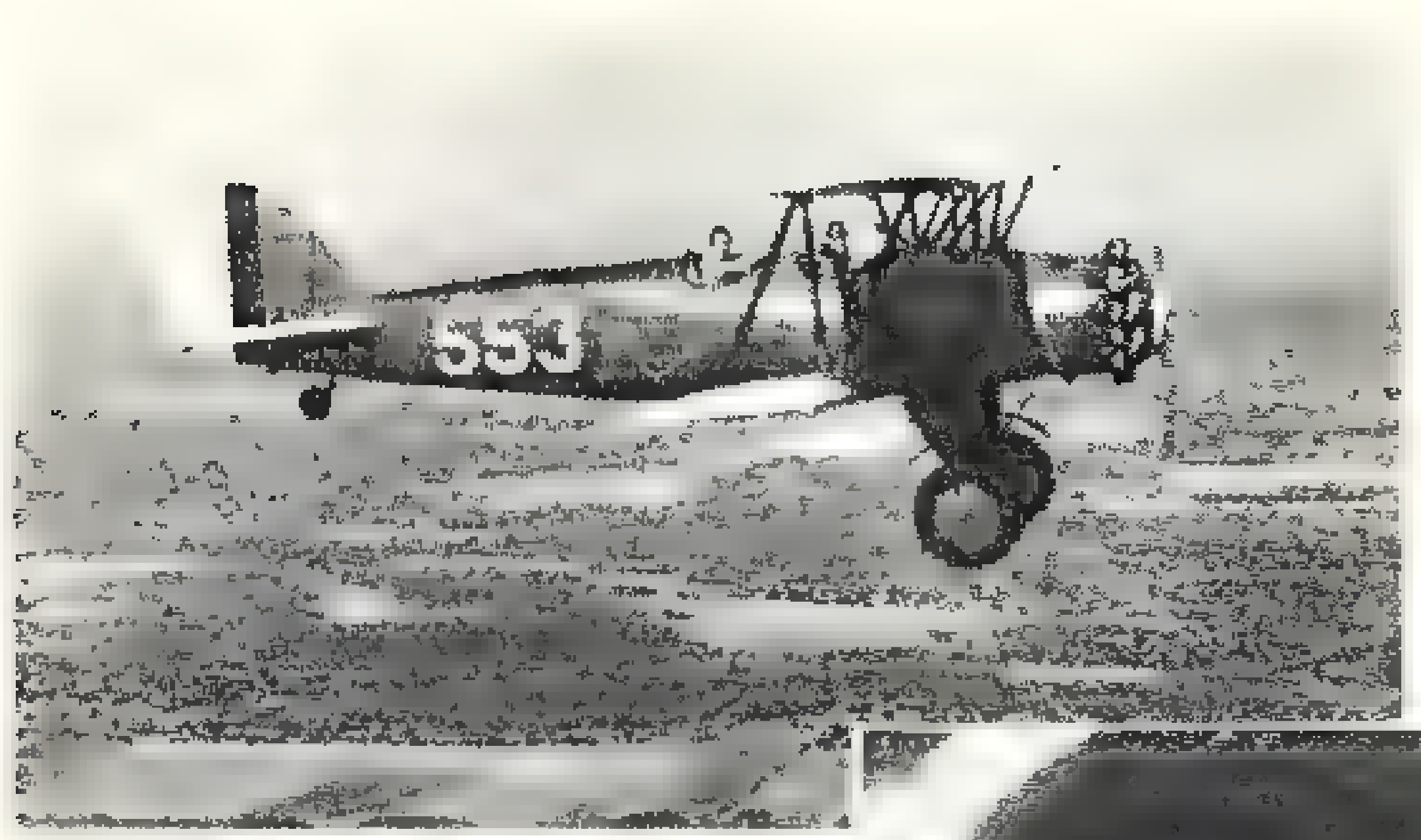
The flange of the front axle cone is sawed off and filed round to fit hole as shown in drawing above. Lead is poured around it for a tight fit.

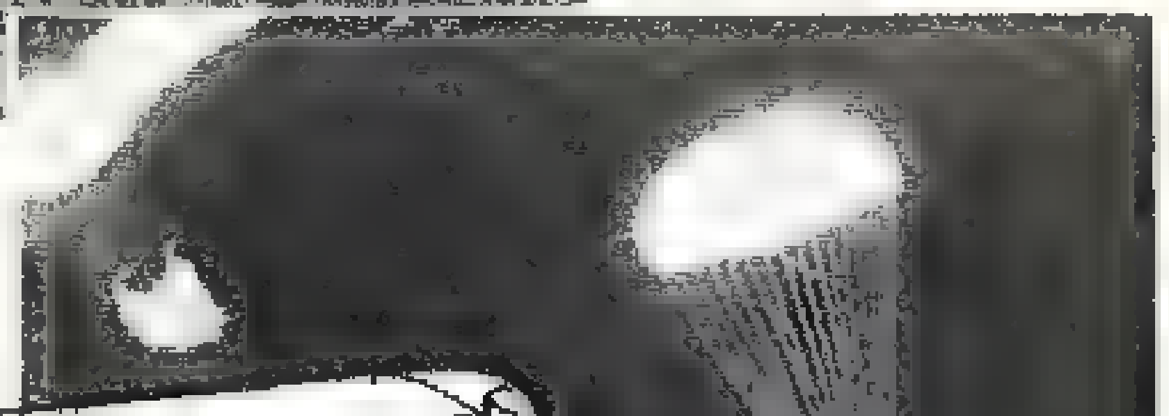
The completed assembly of the MM Soap Box racer is shown in this phantom drawing. 22 ga. galvanized sheet iron is used to form the hood.


GENERAL ASSEMBLY AND CONSTRUCTION DRAWING OF THE CAR DESCRIBED
3/4" PLYWOOD DASH
1/2" PIPE—SEE DETAIL SKETCH OF STEERING WHEEL AND COLUMN
COVER TOP SIDE OF THE FRAME WITH PLYWOOD HERE TO FORM LOW SEAT
3/4" PLYWOOD SEAT BACK
3/4" #6 F.H. SCREWS
22 GA. GALVANIZED SHEET IRON HOOD
FASTEN TO SIDES AND FORMERS WITH SHINGLE NAILS
STRAP IRON BRACE
BRAKE BEAM
1/4" CARRIAGE BOLT
3/8" CARRIAGE BOLT
12 1/4"
21"
9"
SEE FIG 4 FOR REAR AXLE DETAILS
1/4" PLYWOOD FLOOR & SIDES
WHEELBASE 48 INCHES
CABLE TO DRUM
TIE ROD
15 3/4"
TREAD 32 1/4" C. TO C.
SEE FIG. 9 FOR DETAIL OF AUTO TYPE STEERING ASSEMBLY AND BALL BEARING KING PINS
"MUSSELMAN" 10" X 2 3/4" DOENUT-TIRED BALL BEARING WHEEL

Brig. Gen. H. H. ARNOLD Surveys The FLYING Game

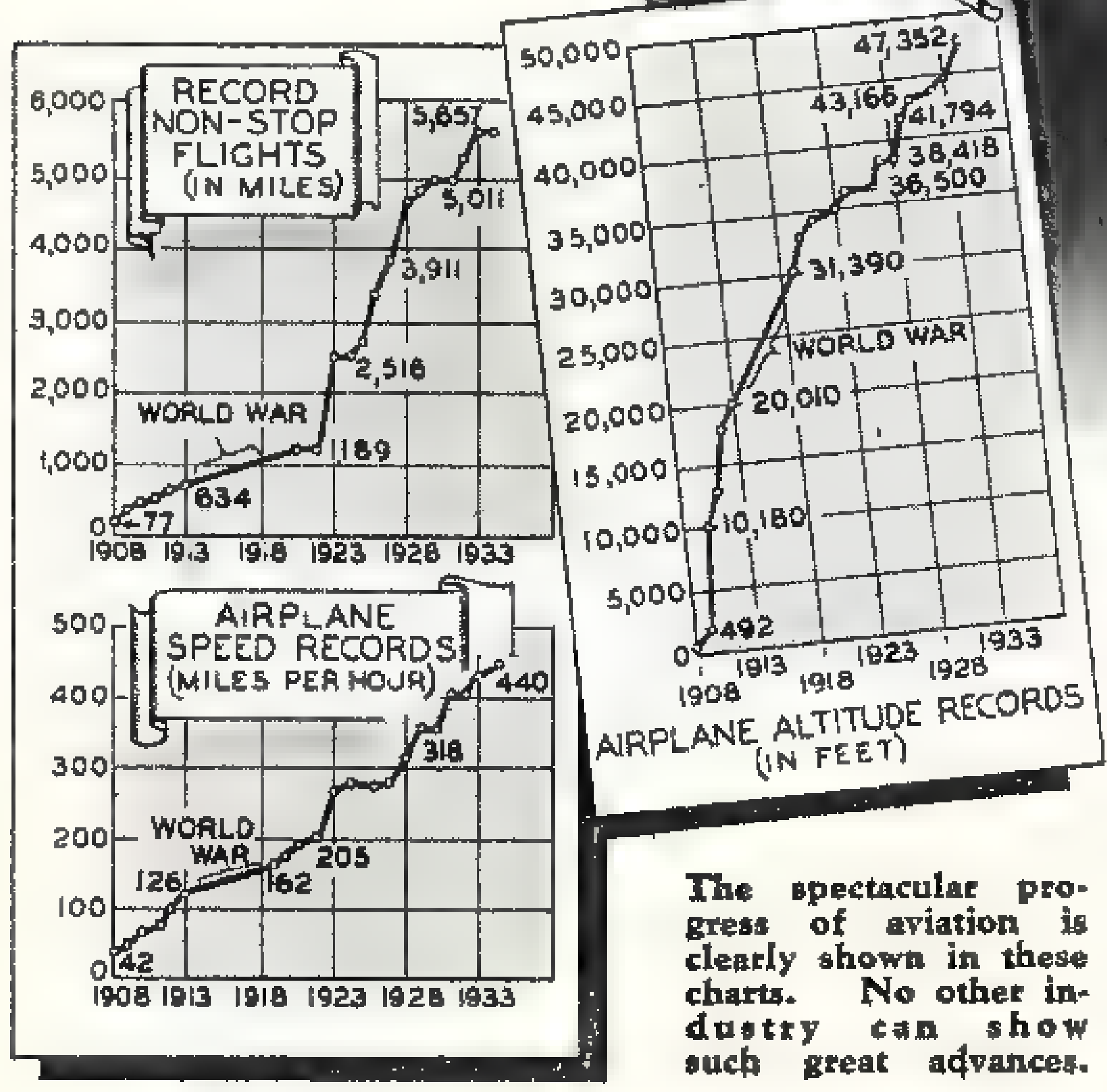
Aviation, the giant infant of Industry, challenges youth to find jobs within its many fields. Where? How? Brig. Gen. H. H. Arnold, former aviation editor of MM, and Major Ira Eaker tell you in this chapter of their book, "This Flying Game," published by Funk and Wagnalls.


After months of intensive ground schooling, the student pilot takes off on a dual instruction flight.


Parachuting. It is not as dangerous as it looks, experienced jumpers claim. Parachutes are life rafts of aviation.

The young pilot, having graduated from dual instruction, is ready for his first solo.

Charts and U. S. Army Air Corps photos reprinted by courtesy of the Funk and Wagnalls Company.



The spectacular progress of aviation is clearly shown in these charts. No other industry can show such great advances.

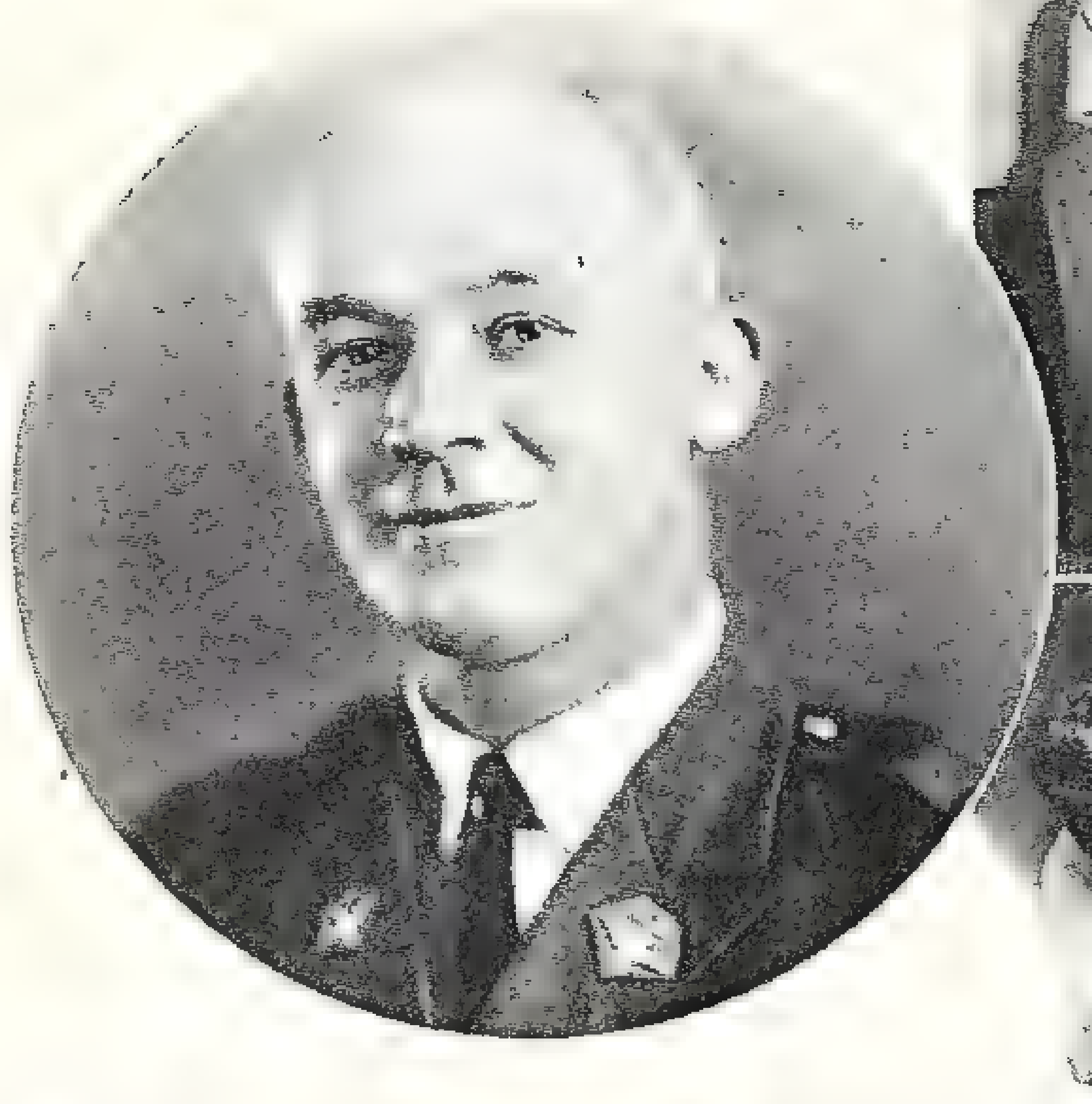
Brigadier General H. H. Arnold, former aviation editor of this magazine, and Major Ira Eaker, two of America's greatest pilots, men who have been in aviation since its birth, have collaborated in writing "This Flying Game," a 268-page book dealing with all phases of aviation. Excerpts from the twelfth chapter of this book, published by Funk and Wagnalls Co., are reprinted here through the kind permission of the authors and publisher.

AVIATION is an industry. It includes many trades and a few professions within its extensive realm. In addition, many of the old and long-established trades and professions have fresh pastures opened up to them as a direct result of this new industry and its demands and opportunities.

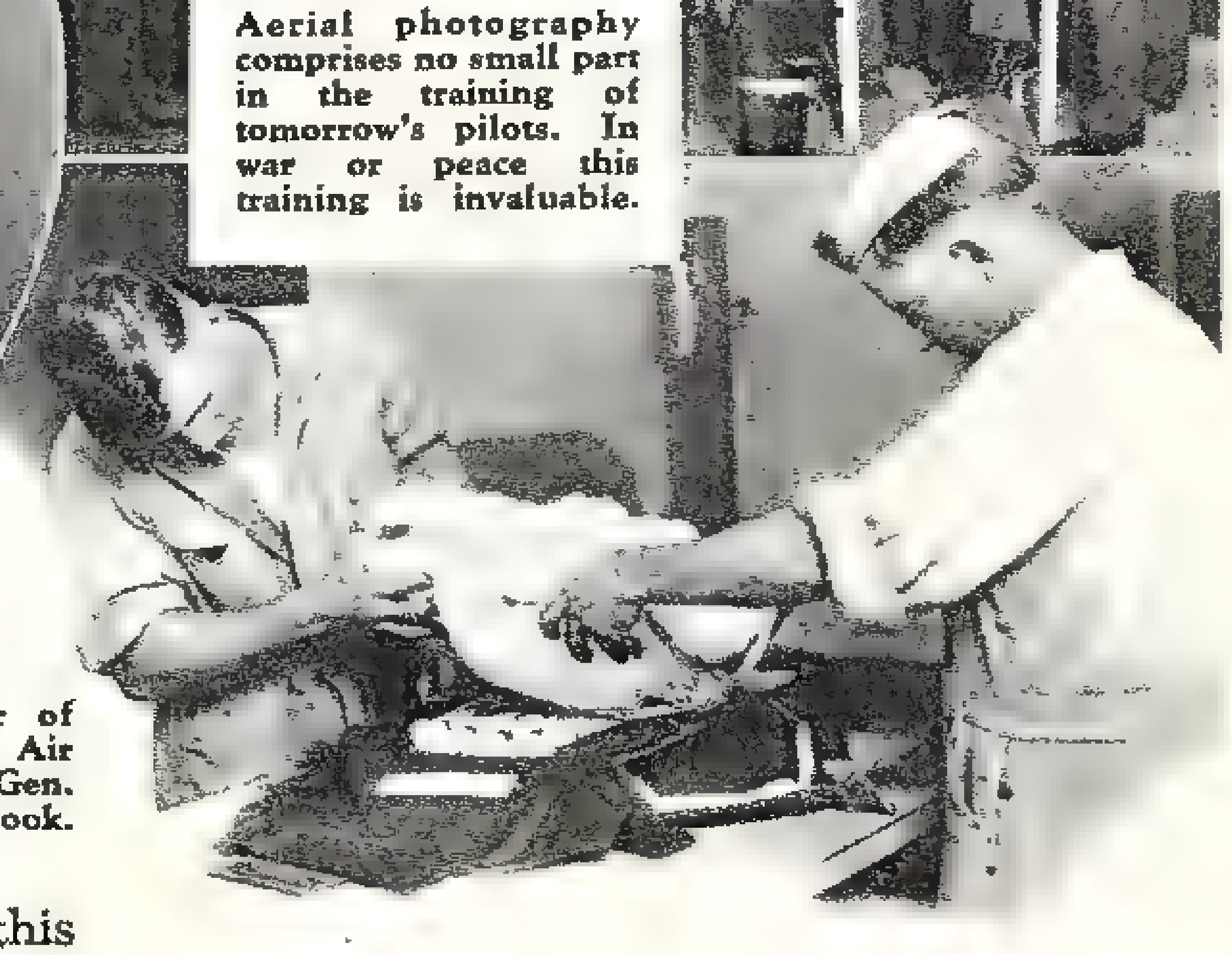
The uninitiated are prone to look upon aviation as merely a collection of pilots. Flying machines and flying men form the complete popular conception of the industry. Too many of us overlook the many men and the varied types of human occupation required to give these airmen something to ride.

Let us outline, briefly, this new field of endeavor; let us follow the tentacles of the octopus and thus learn something of the magnitude of the creature.

On a western airport stands a magnificent plane, ready for a mad dash across the continent tomorrow. Consider that plane. It is a complete vessel but it is composed of a multitude of co-related parts, accessories and complete mechanical assemblies. That machine took a year in the building. First it originated in the mind of an airplane designer; then it was transferred to plotting board by skilled draftsmen. These blueprints, upon being reproduced in manifold and transferred to the factory floor, set more than a hundred men at work on the plane alone. Before actual work can begin, a model of wood, complete in every detail, called a mock-up, must be built up by carpenters and skilled wood workers. This mock-up is then delivered to the metal workers, who duplicate it in dural, since the fuselage or body of the structure will probably be entirely of this material. This requires work by practically every type of artisan known to the metal trades—rollers, cutters, riveters, and formers.


Here is Brigadier General H. H. Arnold, co-author of this article and assistant chief of the United States Army Air Corps. All phases of aviation are covered by Brig. Gen. Arnold and his collaborator, Major Ira Eaker, in their book.

Aerial photography comprises no small part in the training of tomorrow's pilots. In war or peace this training is invaluable.


For almost every hour in the air the student-pilot spends at least 10 on the ground, learning aviation from A to Z. Here two are mastering the art of folding a silk parachute.

After the completed fuselage is rolled upon the assembly floor its power-plant installation begins. Other mechanics install an instrument board, carrying more than twenty instruments and gauges. Others install windows, sound-proof the cabin, and complete the whole with seats and upholstery.

The engine comes to the airplane factory as a complete assembly, but its construction has required an even greater number of skilled designers, engineers and mechanics.

After the plane is completely constructed it is rolled onto the flying field, where line mechanics begin an engine run-in and tuning-up. The test pilot next takes the plane into the air for its trial flight. After the first, there will be slight adjustments of controls, followed by four to ten hours of routine flying to "shake down" the completed article, insuring its satisfactory performance.

Special gasoline and lubricating oil must be placed aboard. These have been prepared for the air industry after a long series of tests, as automobile products are not satisfactory for the airplane engine; thus an allied industry is brought early into the picture.

The plane is located in a flying field especially prepared as a home and landing site for aircraft. This complete installation, with its hangars, runways, shops, operation buildings, and waiting-rooms probably cost more than two million dollars, required a year to build, and made work for several hundred men of many trades, running through the gamut of the building industry.

Before the plane takes off, the pilot will receive complete weather reports gleaned over radio and wire all along his proposed course. These will be interpreted and prepared in final form by skilled meteorologists.

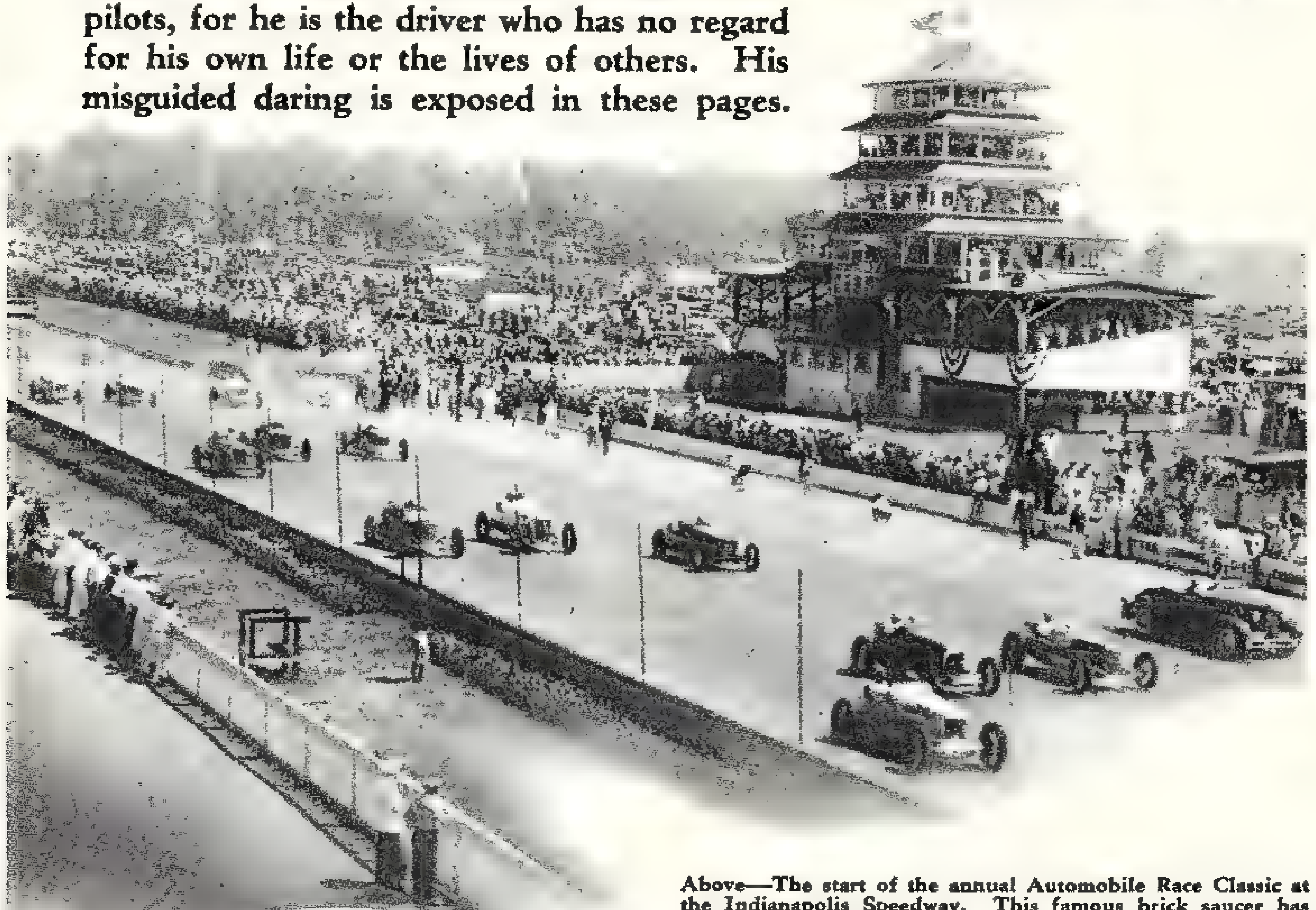
The pilot tunes in his radio for contact with the ground organizations along the airway he is to fly. His course is not marked by

[*Continued on page* 133]

The DAREDEVIL DUB—MENACE of AUTO RACING

The speed maniac is poison to veteran race pilots, for he is the driver who has no regard for his own life or the lives of others. His misguided daring is exposed in these pages.

by FRED GILMAN JOPP



Above—The start of the annual Automobile Race Classic at the Indianapolis Speedway. This famous brick saucer has long been the thrill crucible in which motor cars are tested and is the track responsible for breeding the mechanically-perfect, beautifully-appointed car that you drive today.

On the dirt tracks, those high-banked as shown in the above illustration, the usual skid brings the spinning car down exactly as if it were a marble twirling around a saucer. As a consequence, a pilot is seldom injured when "weaving the apron." It is the outside spin that worries him, for centrifugal force is pushing him outward. When this latter spin occurs on a banked curve, over he goes in a terrific impact which may mean death.

INDIANAPOLIS!

Stands and infield are packed with high-tension humanity. Everywhere is the multi-colored hue of race day. The aroma of crankcase oil is in the air, with all eyes glued to the gigantic brick saucer, where the steel whippets are receiving their final tuning.

"Look!" shouts someone. "There is Kelly Petillo. If the jinx doesn't ride with him, he'll win again this year."

"And there is 'Wild Bill' Cummings over there," says his companion. "Boy, does he roll a fast bus?"

The cars are pushed into starting position, and telegraph keys and press typewriters leap into high and begin their feverish "tick-tack" to a waiting world.

The referee dispenses eloquent caution, then drops his flag. The swarm of motored projectiles shoot forward.

Despite your protracted anticipation, the start is unexpected. A blast of violent, all-swallowing noise from engines suddenly accelerated smites your ears with a pang of sharply-enhanced apprehension. The roar from unleashed cylinders swells and broadens, then temporarily breaks as the pilots lift heavy feet to ease their mounts into the turn. They circle the track and enter the straightaway in perfect start formation. Again the referee snaps his flag downward, this time with an authoritative jerk, and they are off—to a flying start!

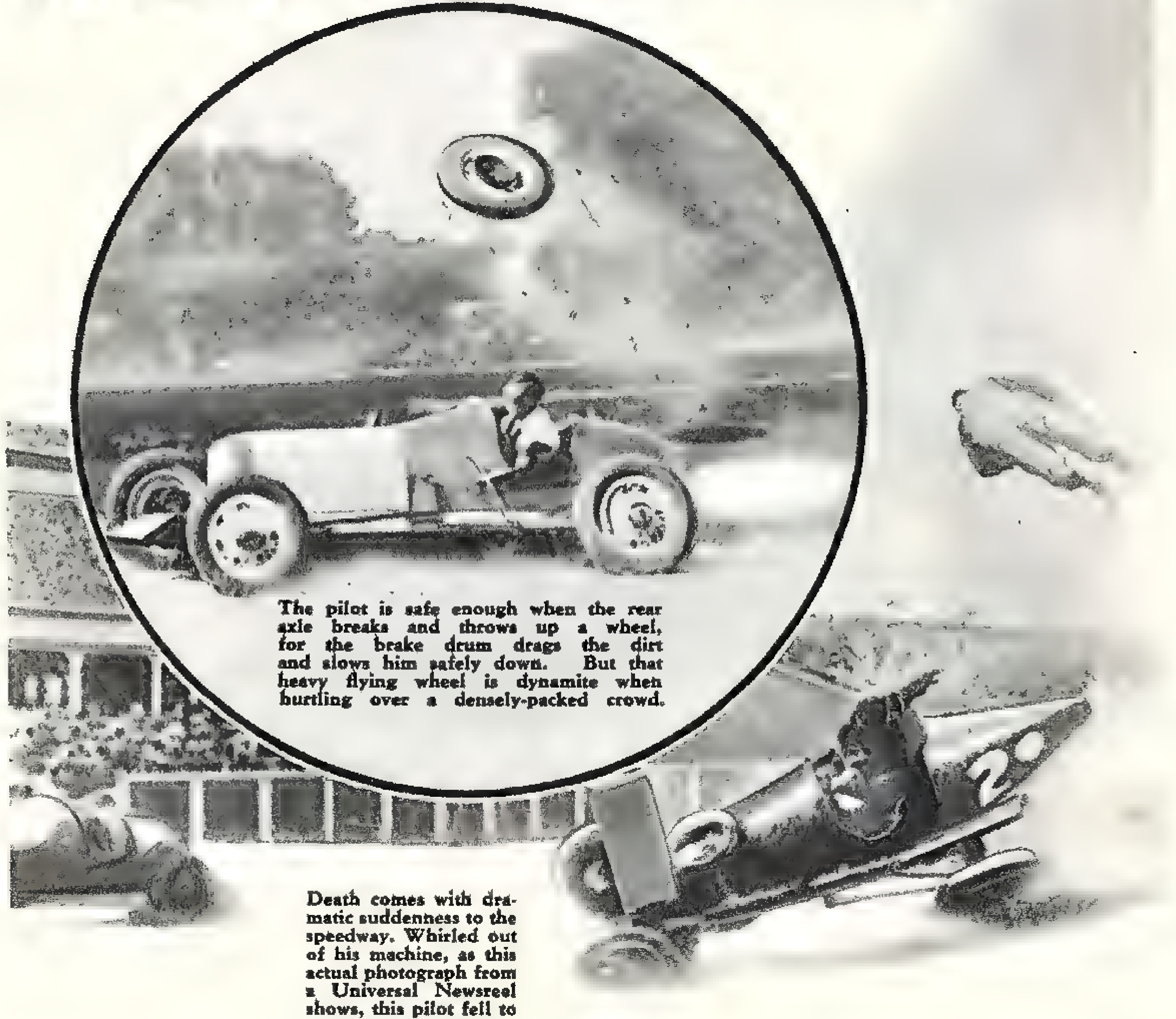
There's Kelly Petillo, Floyd Roberts, Doc MacKenzie and Chet Miller out front, already for these boys qualified for the Champion 100-mile-An-Hour Club by averaging better than "100 miles per" for the entire distance last Decoration Day. And only fourteen others have had the driving stamina and racing luck to win the Indianapolis Race since it was inaugurated a quarter century ago.

Lap after $100 lap the pilots flirt and kid with death, the slipstream flattening them back, ears splitting from the howl of wide-open throttles, and always with eyes front that the curves may not gravity-slap them into the retaining wall.

Lap after lap . . . and look! That skidding car! Those in the stands are out of their seats in a flash, for . . . CRASH!—a tangle of shattered men and cars. It's happened! It was bound to happen. But why?

Down in the repair pits the attendants don't ask why. They know—know that a mechanical break in tight quarters shot a veteran pilot out of control, or that a "dub" pilot messed up the race.

The "dub" pilot seldom will be found in

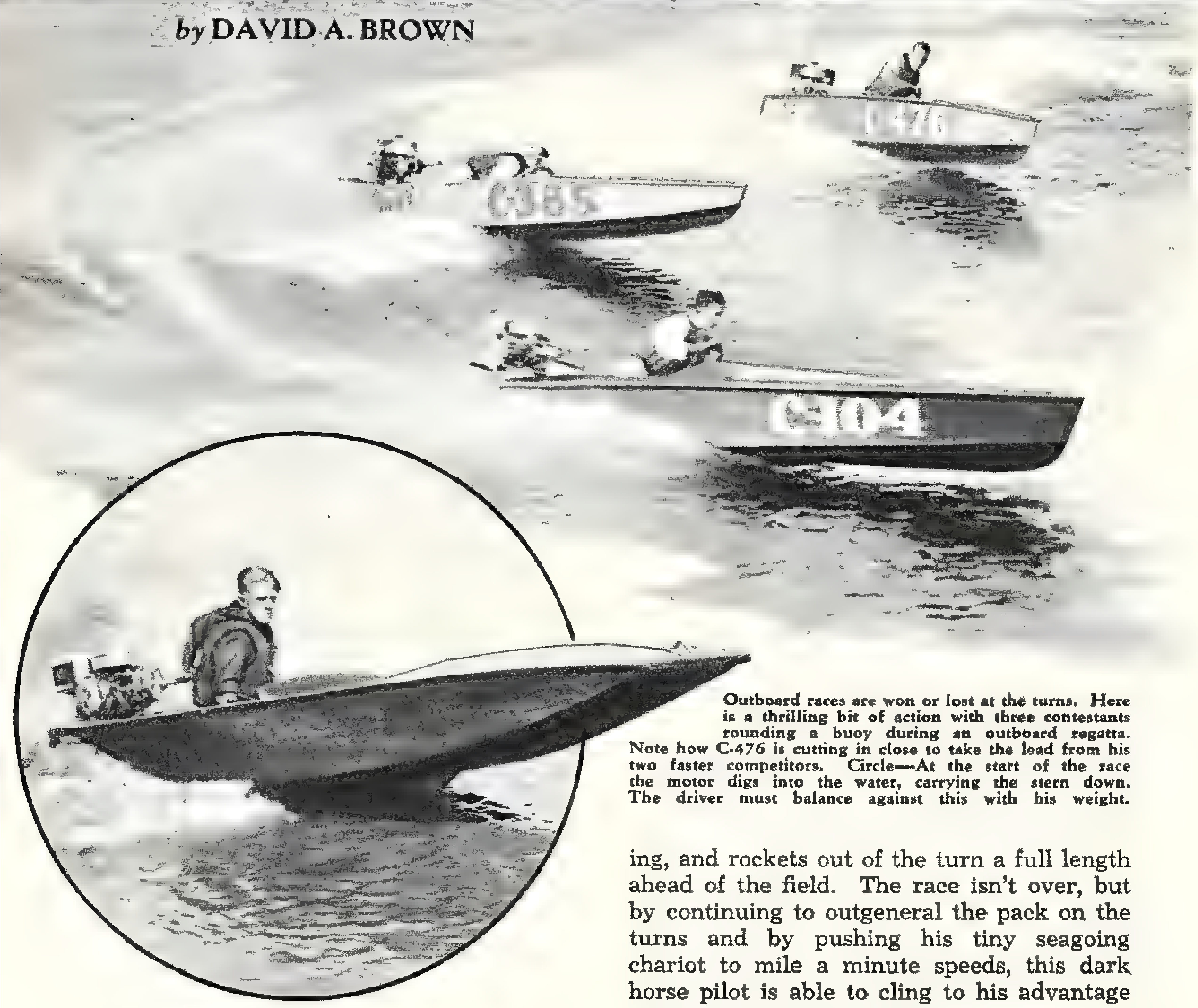


The pilot is safe enough when the rear axle breaks and throws up a wheel, for the brake drum drags the dirt and slows him safely down. But that heavy flying wheel is dynamite when hurtling over a densely-packed crowd.

Death comes with dramatic suddenness to the speedway. Whirled out of his machine, as this actual photograph from a Universal Newsreel shows, this pilot fell to the track in front of his still-rolling car, and it crushed out his life.

SPLITTING the WAVES with the OUTBOARD RACERS

by DAVID A. BROWN



Outboard races are won or lost at the turns. Here is a thrilling bit of action with three contestants rounding a buoy during an outboard regatta. Note how C-476 is cutting in close to take the lead from his two faster competitors. Circle—At the start of the race the motor digs into the water, carrying the stern down. The driver must balance against this with his weight.

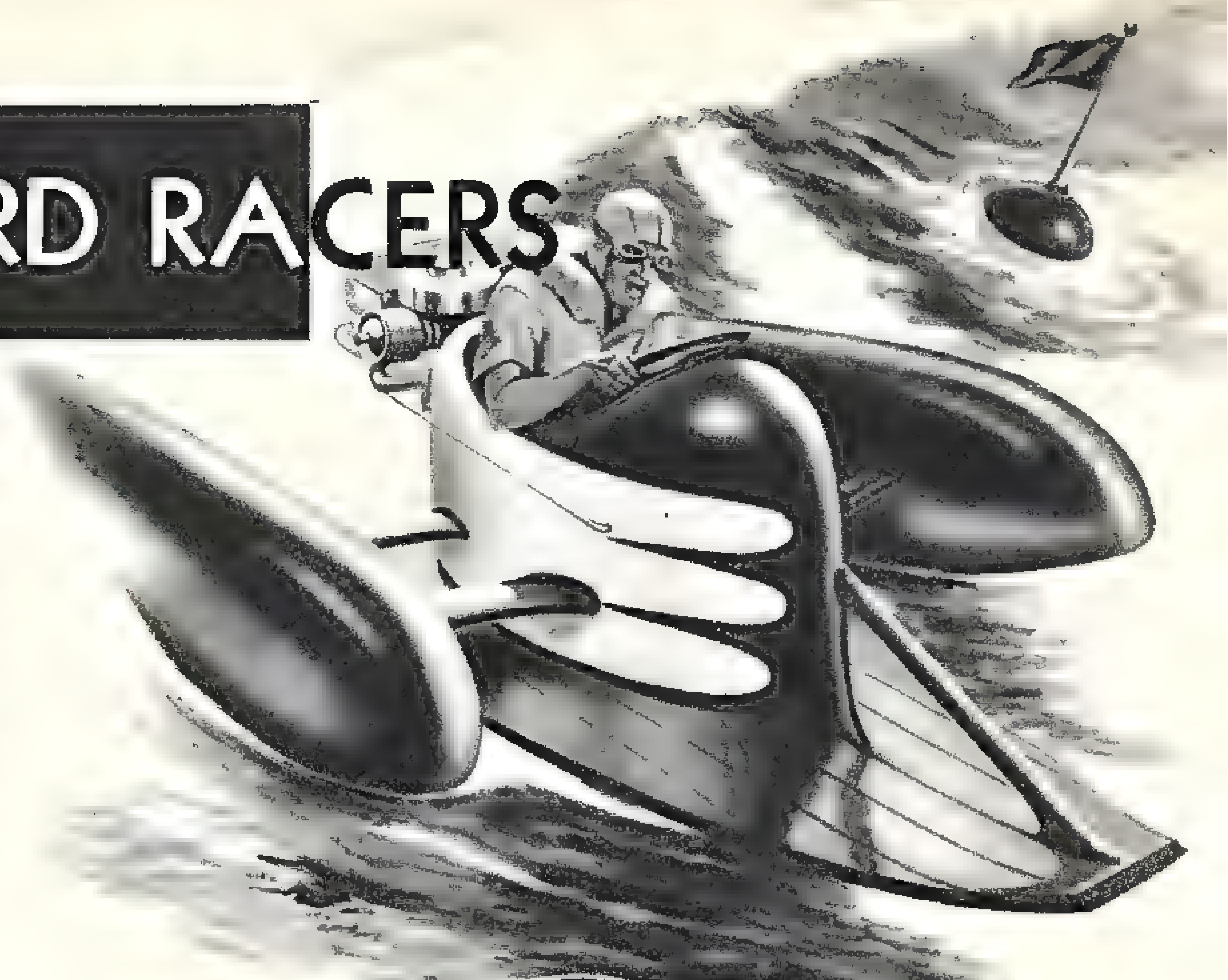
A DOZEN outboard racing boats drive wide open toward the starting line as the hollow boom of a gun rolls out over the river. They get away in a straight line, but as they roar down the stretch three boats pull away and go into the turn fighting for the advantage, their sterns awash in a shower of spray and their bullet noses bobbing like flat stones skipping over the water.

They are rounding the buoy in a bunch when, suddenly, the outside boat, its driver leaning far out over the gunwale to keep it from leaping out of the water, cuts in sharply, drives miraculously through a narrow opening, and rockets out of the turn a full length ahead of the field. The race isn't over, but by continuing to outgeneral the pack on the turns and by pushing his tiny seagoing chariot to mile a minute speeds, this dark horse pilot is able to cling to his advantage and to race home a winner.

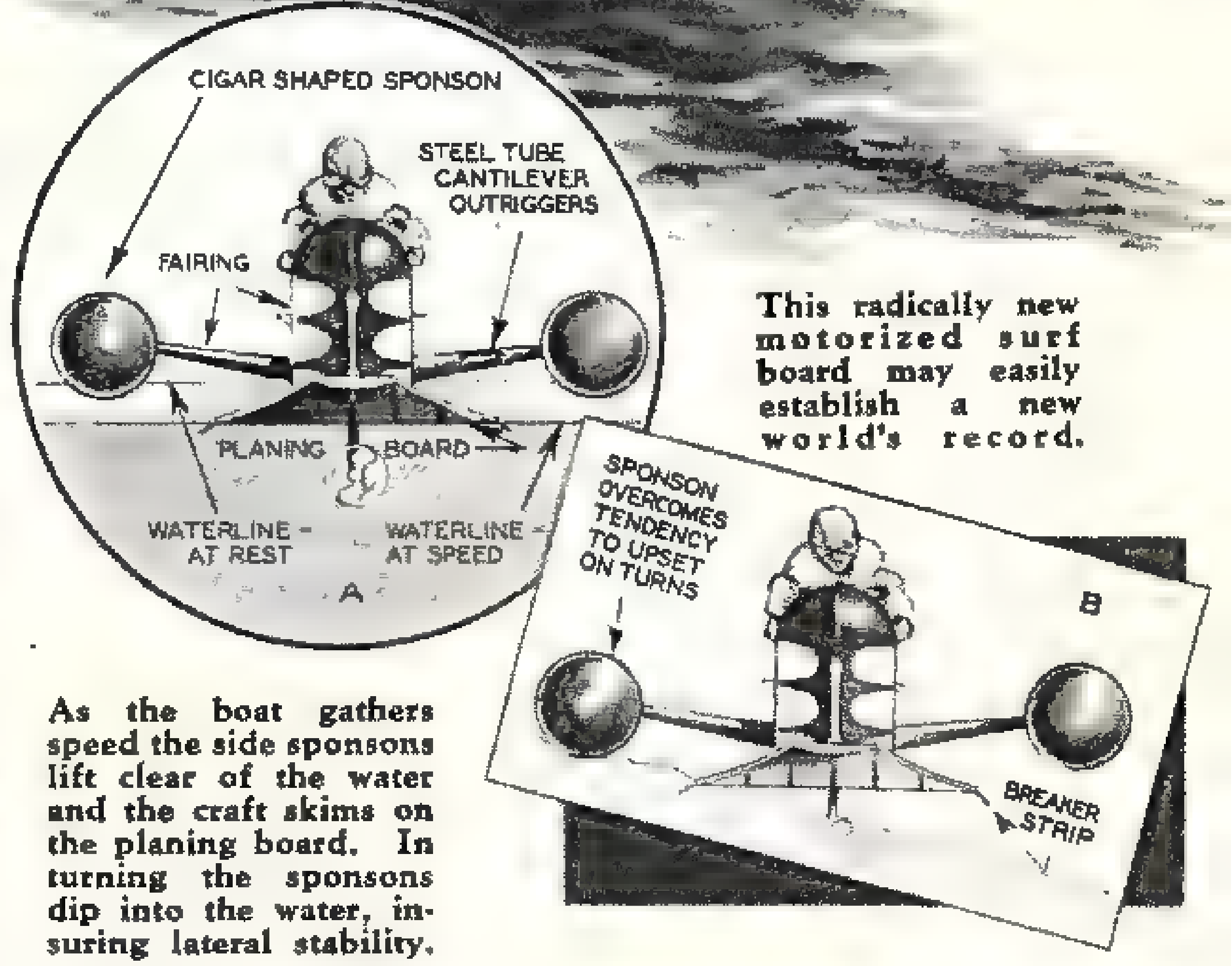
There are few dull moments in any outboard race, but there is little doubt that the greatest thrills come when a field of daredevil drivers race their boats into a breathtaking turn in their efforts to gain a slight lead. It is agreed, too, by the men who drive these roaring river-comets that most races are decided at the turning buoys.

The tendency among boat designers today is toward shorter and wider boats with little or no freeboard. In fact, most of the boats used are designed with sloping decks which meet the hull. One of the most radical of this latter type is shown on the cover of this magazine. Here the hull consists of nothing more than a surf board so designed that all buoyancy is provided by the planing action of the boat at high speeds. Two sponsons keep the craft afloat while gathering speed, and also serve to stabilize it on sharp turns.

Aquatic sports reach their peak of excitement in outboard racing, when sizzling spray fills the air and skill rides the waves to triumph over speed. Each year the records go higher. This article tells why and how.



This radically new motorized surf board may easily establish a new world's record.



As the boat gathers speed the side sponsons lift clear of the water and the craft skims on the planing board. In turning the sponsons dip into the water, insuring lateral stability.

Motors, too, have been greatly improved. Not long ago the speed record for outboard boats was but a little over 25 miles per hour, but today four-cylinder motors which will turn up 6,500 to 7,000 revolutions per minute are used in Class F and Class X, and the record has been pushed up to 69.383 miles per hour. In fact, even the midget racers—50-pound boats powered with motors of 7½ cubic inches piston displacement, with their tiny two-cylinder motors have done better than 33 miles per hour.

The beginner at the sport, then, must learn not only how to eliminate the hazards that exist on the turns, but how to make use of them to gain an advantage. Leading the field, a pilot should hug the buoy as he goes into the turn and swing around it as sharply as possible to block out his opponents. However, if a boat is prevented from taking the inside, the turn may be made so as to bring the boat about close to the buoy and inside of leading opponents as the swing is completed. Often a trailing boat may be maneuvered into the lead in this manner.

If a turn is made too sharply, however, excess cavitation—propeller churning up water without developing power—will cause a loss of speed which will more than off-set the saving in distance traveled. There is also the danger of wind catching the tilted bow and capsizing the boat in a close turn, as well as the possibility of a spill resulting when the outside gunwale dips and catches in the water as the boat slips away from the turn. These accidents may be prevented by moving forward in the cockpit and throwing the weight out across the gunwale on the inside of the turn until the buoy is rounded and the boat is straightened out for the return.

River currents also must be carefully gauged. If the motor is throttled down too soon when going into a turn, a strong, adverse current may carry a boat into the buoy and wreck it. There is, too, a danger of being carried far beyond a down stream marker if

Outfitting for the Canoe Trip

by ROBERT PAGE LINCOLN

Above— Square-sterned canoes for outboards are becoming increasingly popular. Right— Lincoln demonstrates inconvenience of carrying oil in five gallon cans.

IN THE estimation of most seasoned wilderness "trippers" there is only one type of boat that really fits into the situation when one is considering an extensive water jaunt and that is the canoe.

The canoe of years ago, and somewhat in the present day, were round-bottomed. As a direct result they had but little gripping power on the water surface and would tip and roll from one side to the other. The canoes of today have not only a most desirable width at beam, but the bottom is almost flat over a generous portion of its area. This flat-bottomed effect makes it cling to the surface in a manner that stalls off any real possibility of the canoe's tipping over.

A sixteen-foot canoe is considered of sufficient length for two persons. For three persons, however, the so-called guide's model, eighteen feet in length, is a recommendation. This will permit of four packsacks to be lodged on either side of the canoe, eight in all. Or if a third person is carried, then that person may be seated toward the stern, just forward of the rear thwart.

A neck or shoulder yoke to be used on the portages in carrying the canoe is a recommendation, especially if you are unfamiliar with carrying the canoe. These simplify portaging at least fifty per cent.

Square-sterned canoes are often used in the north and Canada, where the outboard motor is brought into use. This type of canoe is rather heavy, but where there is comparatively little portaging to do it fits in perfectly; has a generous wide bottom, and is excellent to fish out of.

The impression is often had that the outboard motor may be used only on a square-sterned canoe. As a matter of fact, more outboard motors are used on the everyday sharp-bow, sharp-stern canoe than on the square stern. There is a bracket attachment made especially for canoes of this everyday type, as the result of which the motor is lodged on the side of the canoe, near the stern. Both the twin and single type of motor are used on the canoe. With outboard motors now being had as light as 20 pounds up to 30 pounds the excess baggage thus brought along is not overly great. Indeed, by the use of the motor the length of a canoe trip can be stretched out to twice the distance one would go if just paddling.

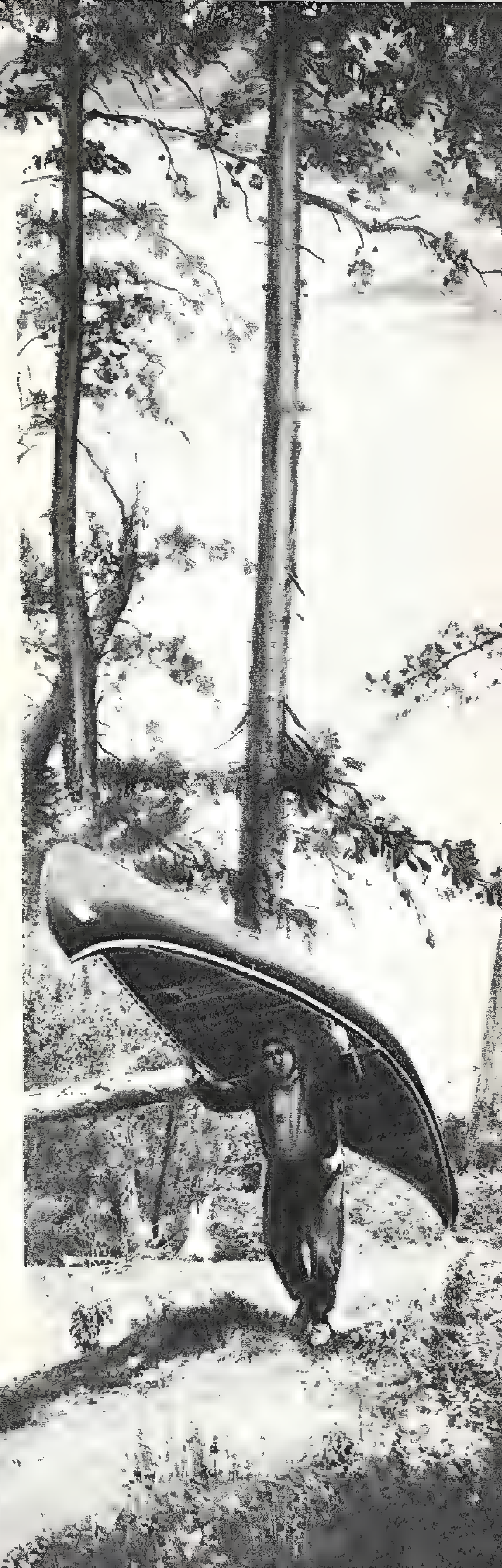
The gasoline and oil are mixed together at the start of the trip, and are preferably carried in square gallon tins. These are then lodged in a packsack especially made for the purpose, cut straight as to side and flat bottom, so that the straight-sided tins will rest side by side in a truly compact fashion. A pack of these tins will weigh a little more, but they are far easier conveyed in this fashion than in the regulation five and ten-gallon cans.

While the canoe leads in consideration on a wilderness trip, it should be remembered that all other items in the outfit, each in its department, require thoughtful selection. Regulation shelter tents of the so-called canoe tent or forester type are much favored. It is a requisite that these tents be so made that all windows and openings be covered with netting or bobbinet, to keep out all winged pests. Usually when the occupants of the tent are in for the night the plumber's candle that is carried for light will reveal any mosquitoes inside. They invariably alight on the canvas, when a touch of the candle flame will singe them. One can thus kill every mosquito inside of the tent. It is necessary to kill each one because one can keep you awake as well as fifty.

Since air mattresses and sleeping bags are often used, and are recommended in

[*Continued on page* 122]

The end of a perfect day. The modern canoeist takes his comfort with him into the woods. Air mattresses are replacing the laboriously cut balsam boughs, light tents eliminate lean-tos, while enough dehydrated food for a two weeks' trip can be conveniently packed into a good-sized knapsack.



On portages a neck yoke should be used to simplify the task of carrying your canoe through the brush. If you do not have a regular neck yoke, one can be improvised by lashing your paddles to the thwarts parallel to the gunwales. In this way the carved handgrips of the paddles just fit the shoulders, and by moving the paddles back and forth, you can find the best balancing point.

Building Usefulness Into Your Neglected Basement

THE basement, long the repository for cobwebs, lumber scraps, and discarded junk, is rapidly undergoing a transformation which will make this long neglected room one of the most popular in the house.

In a recent contest sponsored by the American Radiator Company among members of the New York School of Fine and Applied Art, 36 notable examples of what can be done with a cluttered up basement were presented. Working from floor plans and photos of actual cellars, the students built models of sports rooms, hobby rooms, play rooms, studios and all-around utility rooms.

The contestants tackled the problem by disguising obstructive beams and pipes with an all-over color scheme of unified colors. Basement pillars were used as the center for circular benches, tables or cabinets, while the floors were painted or covered with linoleum. The rough plaster walls were painted in pleasing colors, and in many cases were concealed behind shelves, book cases, or covered entirely with paneling.

The model basements, placed on display in Rockefeller Center, New York, immediately focussed nationwide attention on the Ugly Duckling of the home. Architects hurriedly began making estimates on the costs of converting disreputable basements into charming rooms. They found that even in the most horrible examples the restoration would not exceed $400, while with the exercise of a little ingenuity, miracles could be wrought for as little as $50.

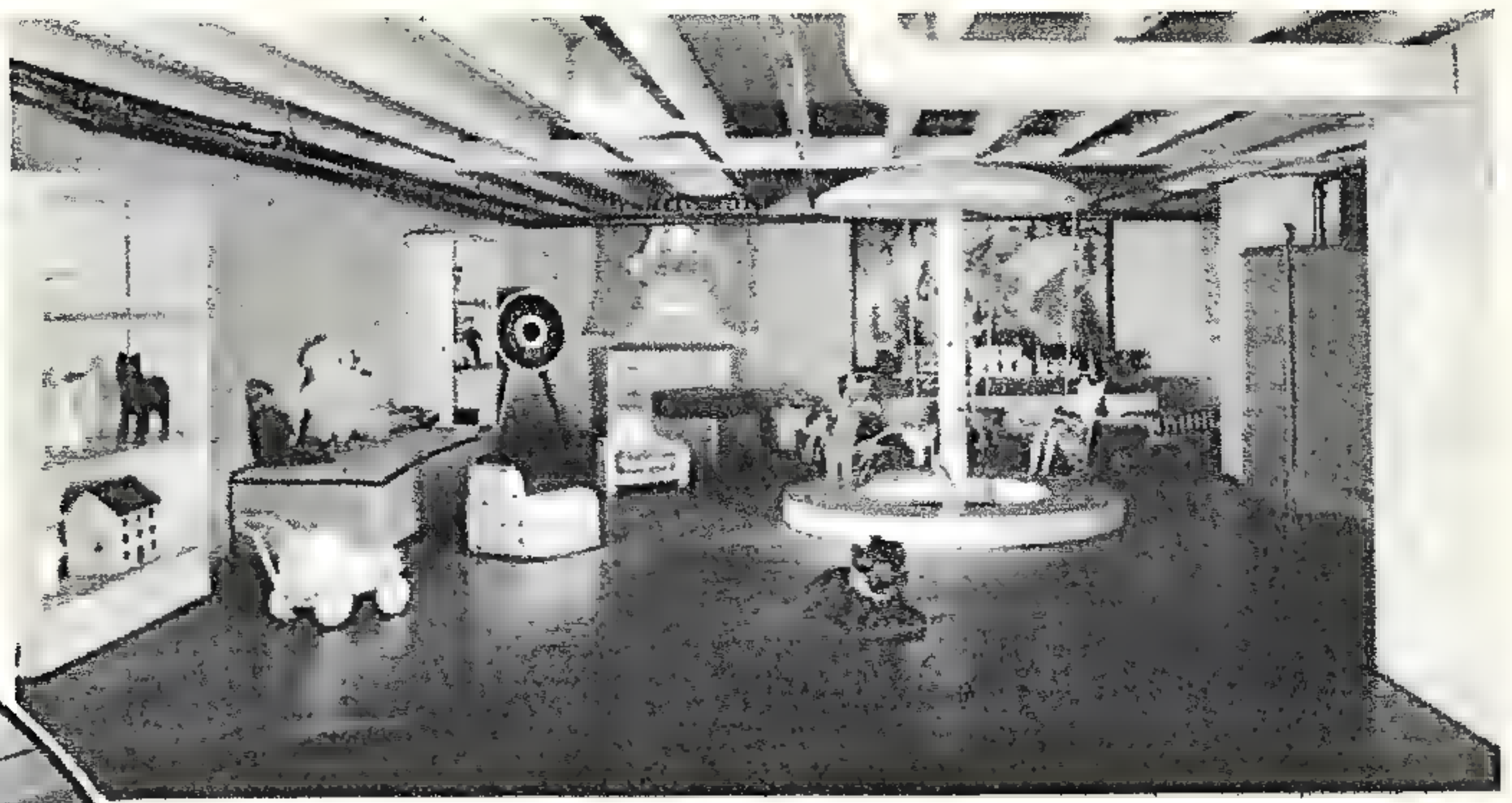
Naturally the camouflaging of the furnace is a big item. If it is a coal burner this is usually accomplished by boxing it in a room by itself. Modern oil burners and air conditioners with their bright finishes and new designs, need no such concealment.

If you are handy with tools, any number of treatments will suggest themselves. By using composition materials, you can write your own price for transforming the neglected basement into the home's most popular room.

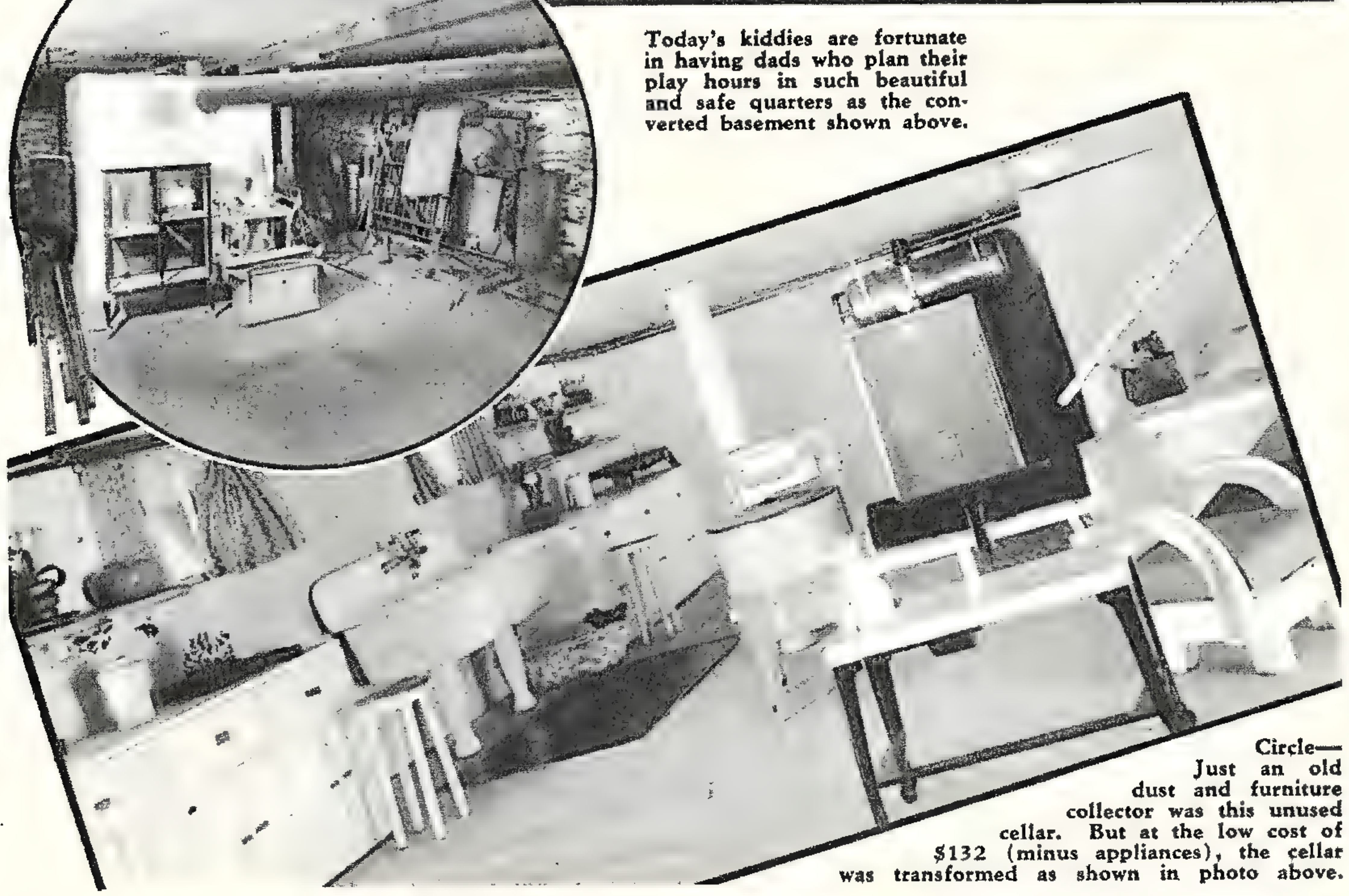
COST OF CONVERTING CELLAR INTO PLAYROOM

STRUCTURAL ALTERATIONS	
Erection of partition	$18.00
CABINET WORK	
Merry-go-round, shelves, train table, etc.	64.00
PAINTING	
Walls, ceiling, floor and furniture, including paper "mural"	75.00
	$157.00

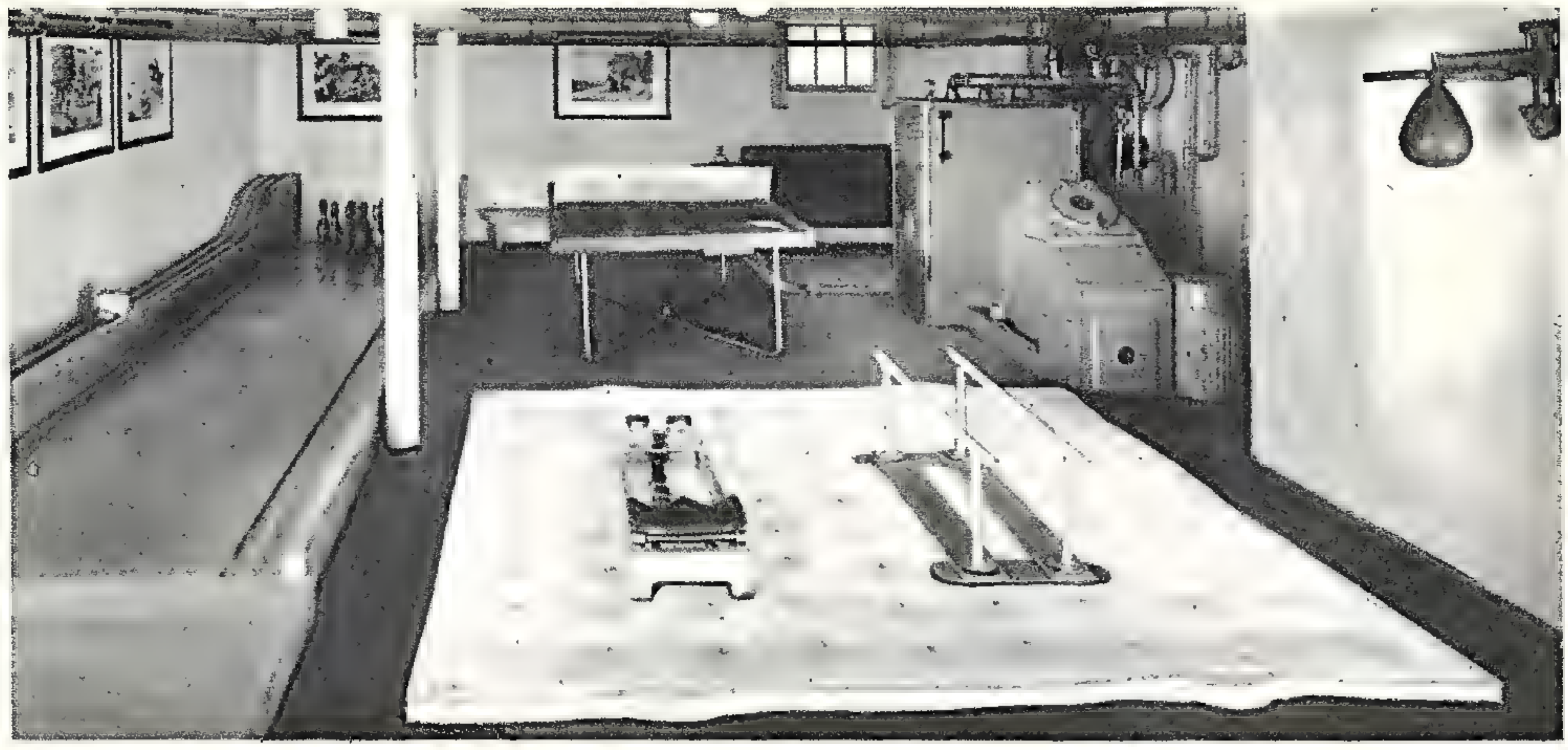
Special Furnishings, $83.00



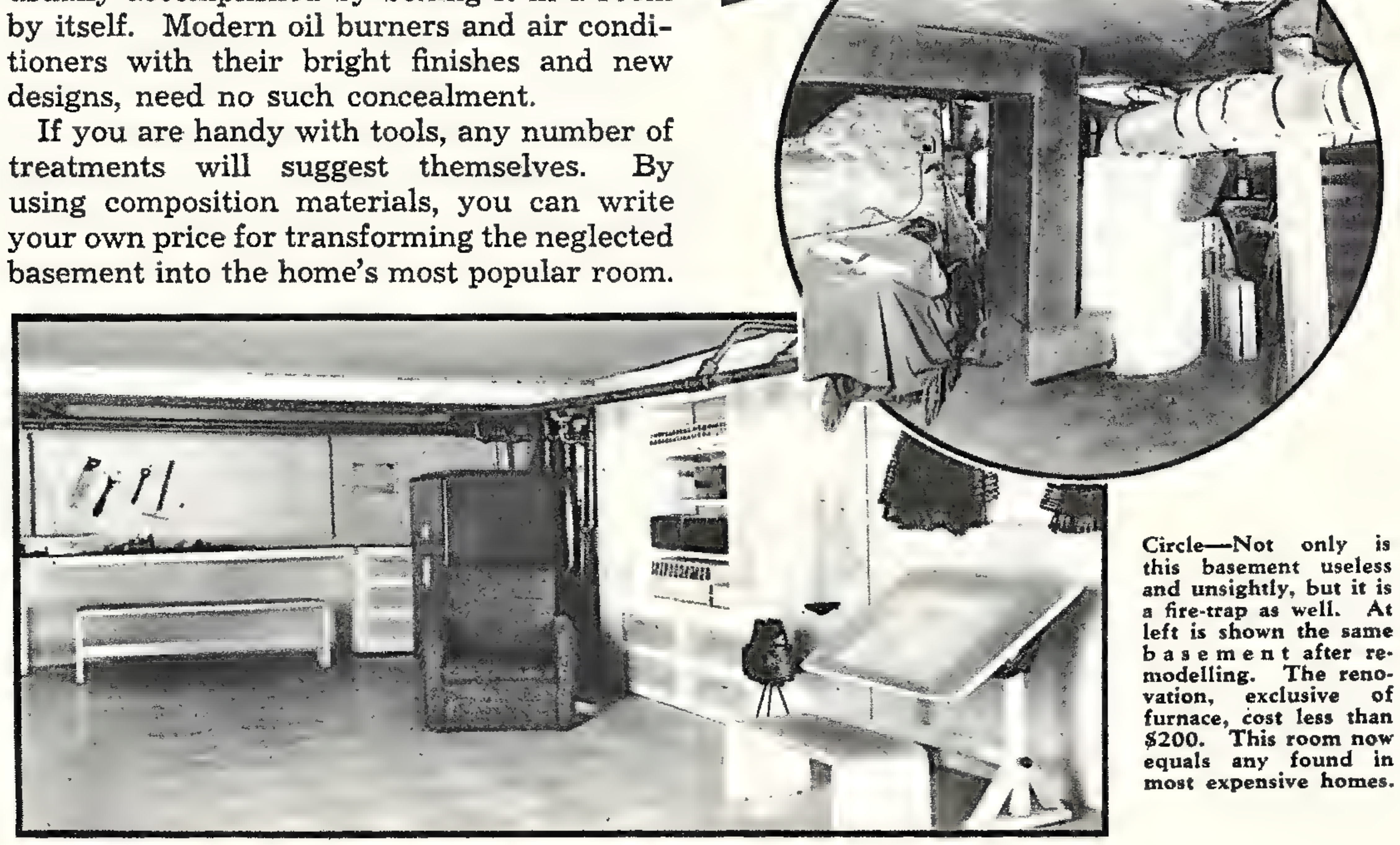
Today's kiddies are fortunate in having dads who plan their play hours in such beautiful and safe quarters as the converted basement shown above.



Circle—Just an old dust and furniture collector was this unused cellar. But at the low cost of $132 (minus appliances), the cellar was transformed as shown in photo above.



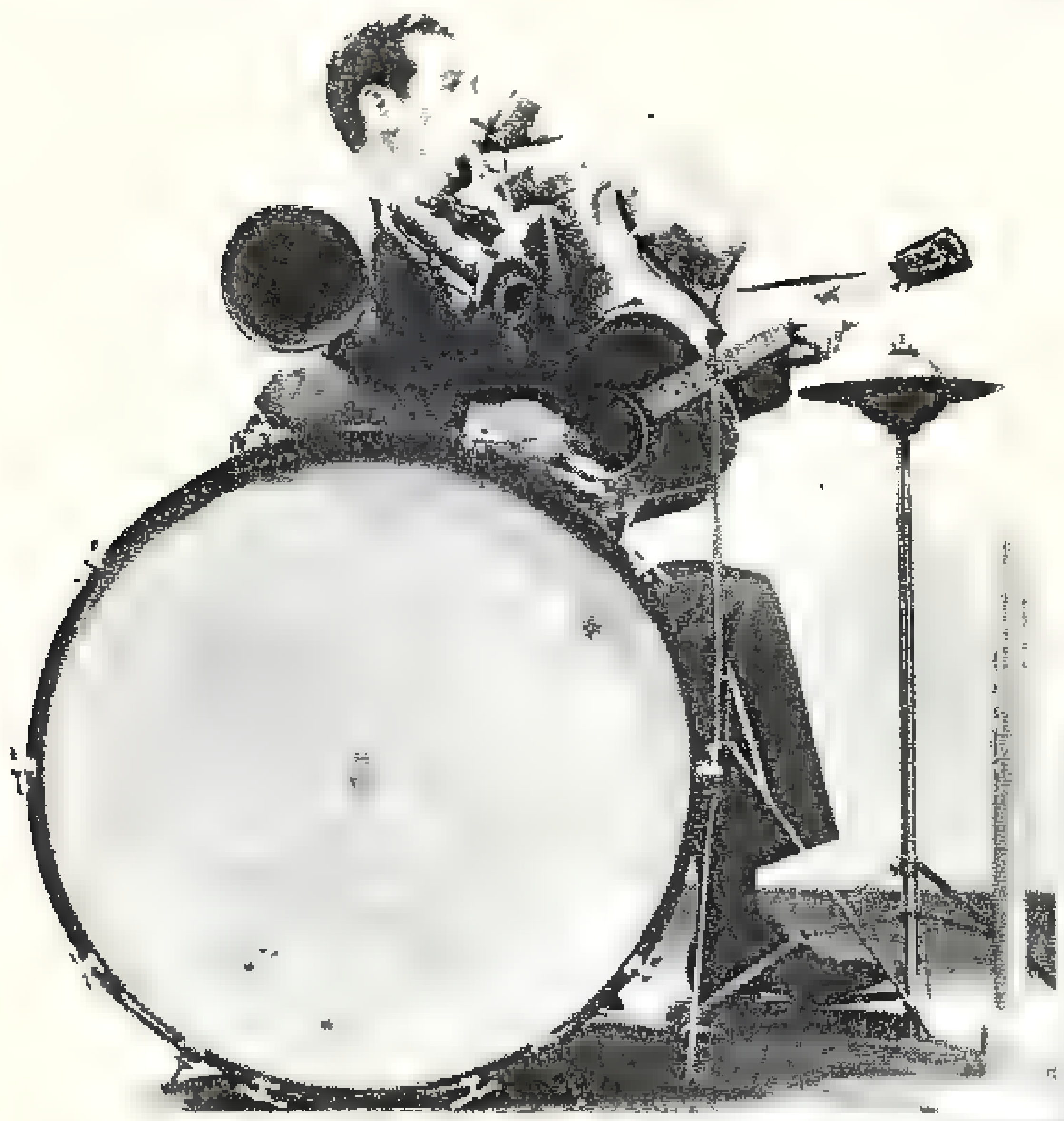
This basement belongs to an athlete, with the construction cost (without gymnasium equipment), 190 well-spent dollars. The draftsman (right) spent $235 for his home hobby.



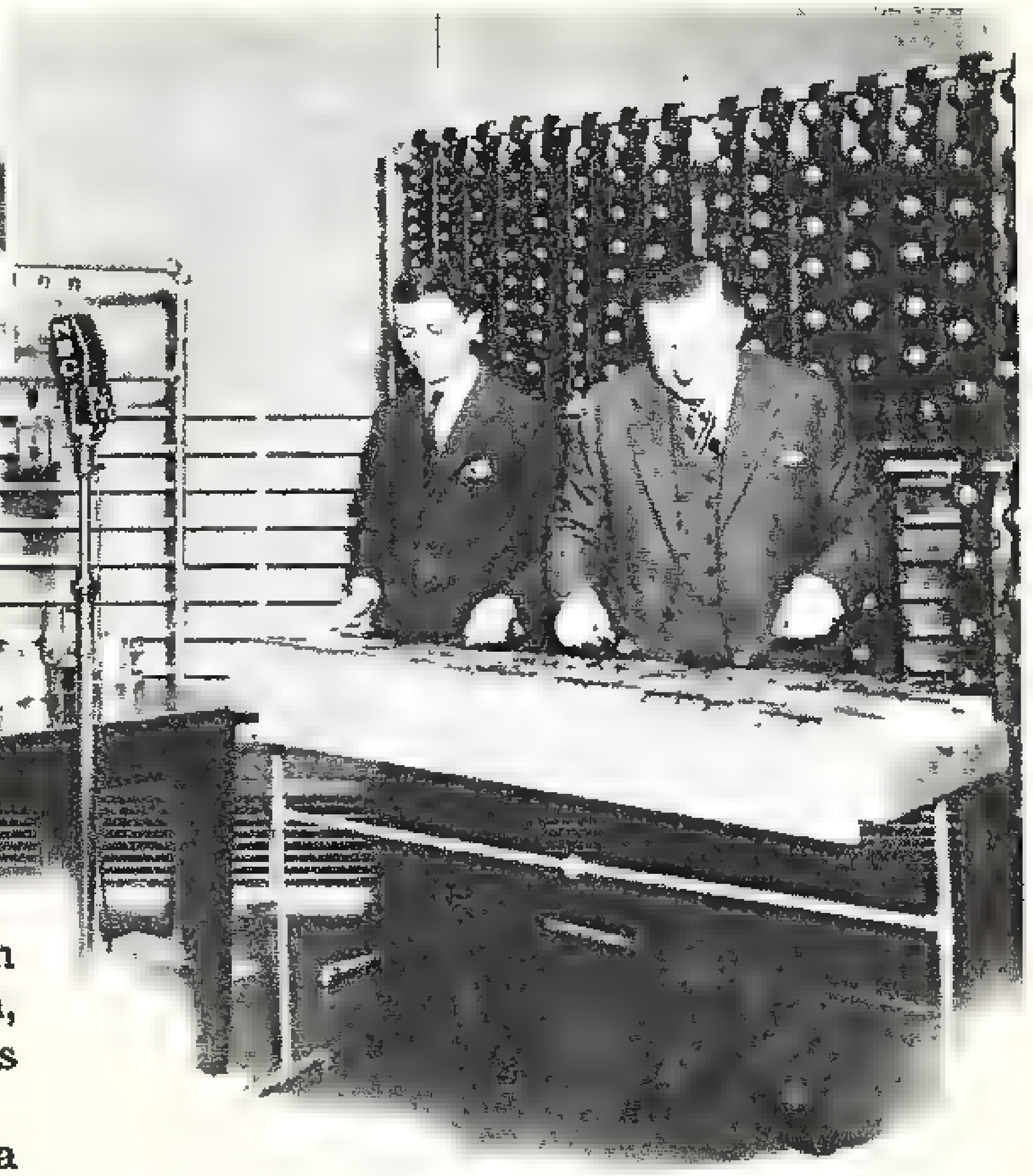
Circle—Not only is this basement useless and unsightly, but it is a fire-trap as well. At left is shown the same basement after remodelling. The renovation, exclusive of furnace, cost less than $200. This room now equals any found in most expensive homes.

MUSICAL FREAKS Win Fame for MAJOR BOWES' Amateurs

All right, all right! Wire, glass, tin cans—anything. It was all the same to these boys, who made jobs grow from their mechanical ingenuity. This article relates what you didn't hear on the radio.



Just try to arrange all the instruments above so that they will be instantly available to your lips, hands, knees and feet. Vincent Muni did it—made the "music go round and round" the nation to bring him instant fame. But it took mechanical ingenuity, plus the ability to play, to merge the whole into a weekly salary.



Rehearsal found the Major tinkling Jack Sevant's window glass xylophone, with the tincanaphone running second.

IT'S marvelous how a home workshop fan can make himself famous with a broom, a saw, a dozen tin cans or a few dingy bottles picked up from a junk pile.

Take these assorted ingredients, mix in a little inventive genius, and you have the makings of a typical success story as dramatized every week before the nation-wide audience of Major Edward Bowes' famous radio Amateur Hour.

On the Amateur Hour, saws sound like violins, milk bottles like xylophones, and glass tumblers like cellos. Almost any day some workshop musician may emerge with a band saw that sounds like an orchestra, or a drill press as versatile as a pipe organ.

Victor Lundgren is an example of a young man who made good on the Amateur Hour as the inventor of a musical instrument which any home craftsman can duplicate in a few minutes. An ordinary house broom is the backbone of his instrument. He stretched a single wire along the handle, elevating it with a bridge like that used on a violin. For a sound chamber he took an old wooden box about six inches square.

This slides up and down along the broom handle and amplifies the musical notes produced by playing on the single wire with a violin bow.

Steeple Jack Kay's musical invention is even simpler. He plays an ordinary harmonica, the simple music-producer made famous on radio and in the movies by Borrah Minevitch and in his Harmonica Rascals, but he does it with the mouth organ held out of sight behind his head. He does it by remote control through the medium of a two-foot length of rubber tubing. One end of the tube is held in his mouth; the other end delivers lung power to the proper openings in the harmonica.

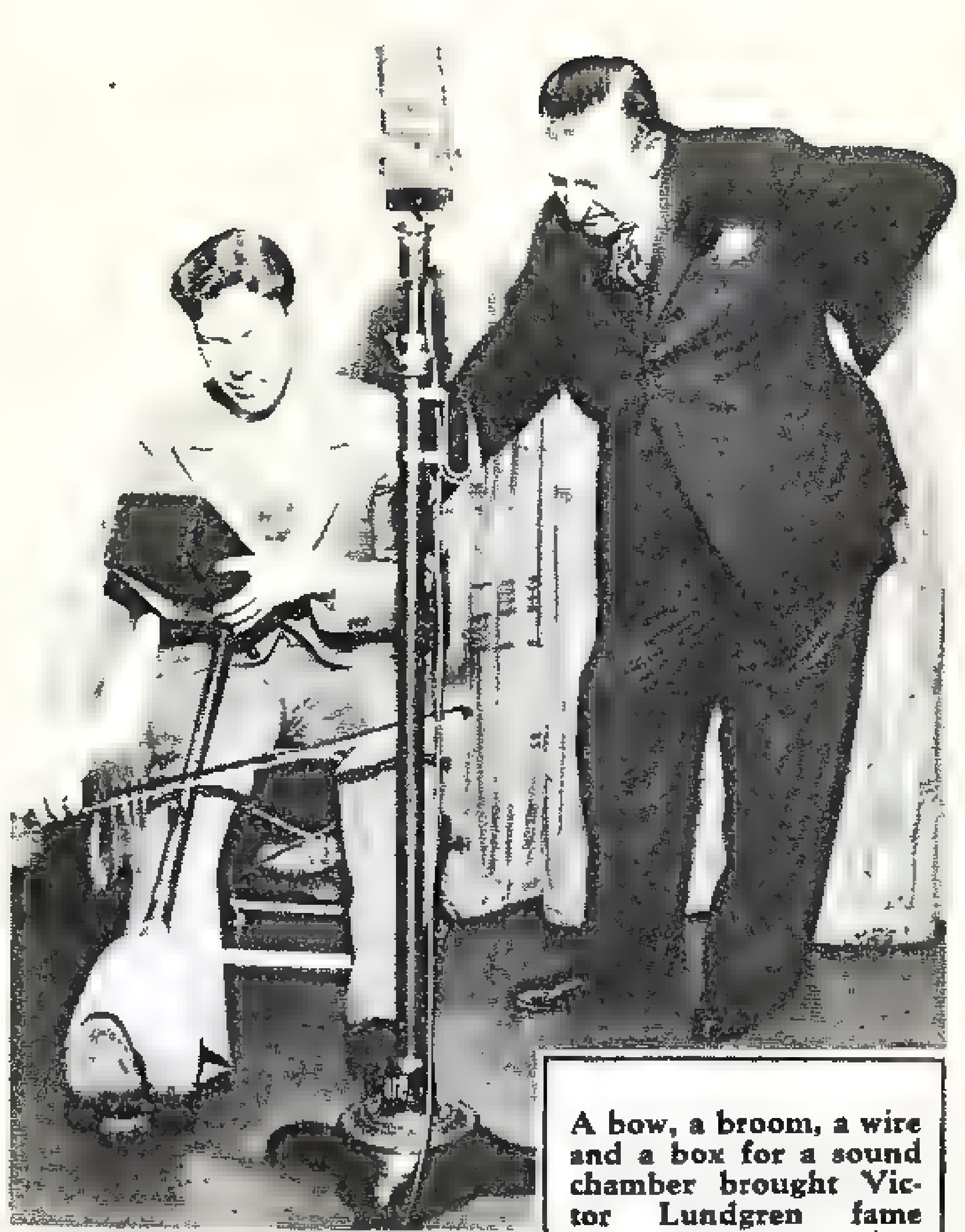
Somewhat more complicated are the inventions of Jack Sevant, who is practically a symphony orchestra all by himself, with no less than four novelty instruments to his credit. He was employed as a sweeper in a factory until he made such a hit on the Amateur Hour that he was signed as a member of a Major Bowes traveling unit which tours the theatres of the country.

His musical bottles look like a drug store window display, except that they hang by their necks from a crossbar. They are arranged in graduated tones, like the keys of a piano. The bottles are tuned by filling them with varying amounts of water, and are tightly corked to prevent evaporation. When tapped with small hammers, bell-like tones are produced. A cotton string is tied behind the row of bottles, touching them and dampening the after-vibrations like the soft pedal of a piano.

Similar in principle is Mr. Sevant's "tincanophone," in which cans are used instead of bottles. He even leaves the labels on, and thus A sharp may be tomato soup and High C sliced pineapple. The labels cannot be taken too seriously, however, for the food contents are removed from the cans and they are tuned in much the same way as the bottles.

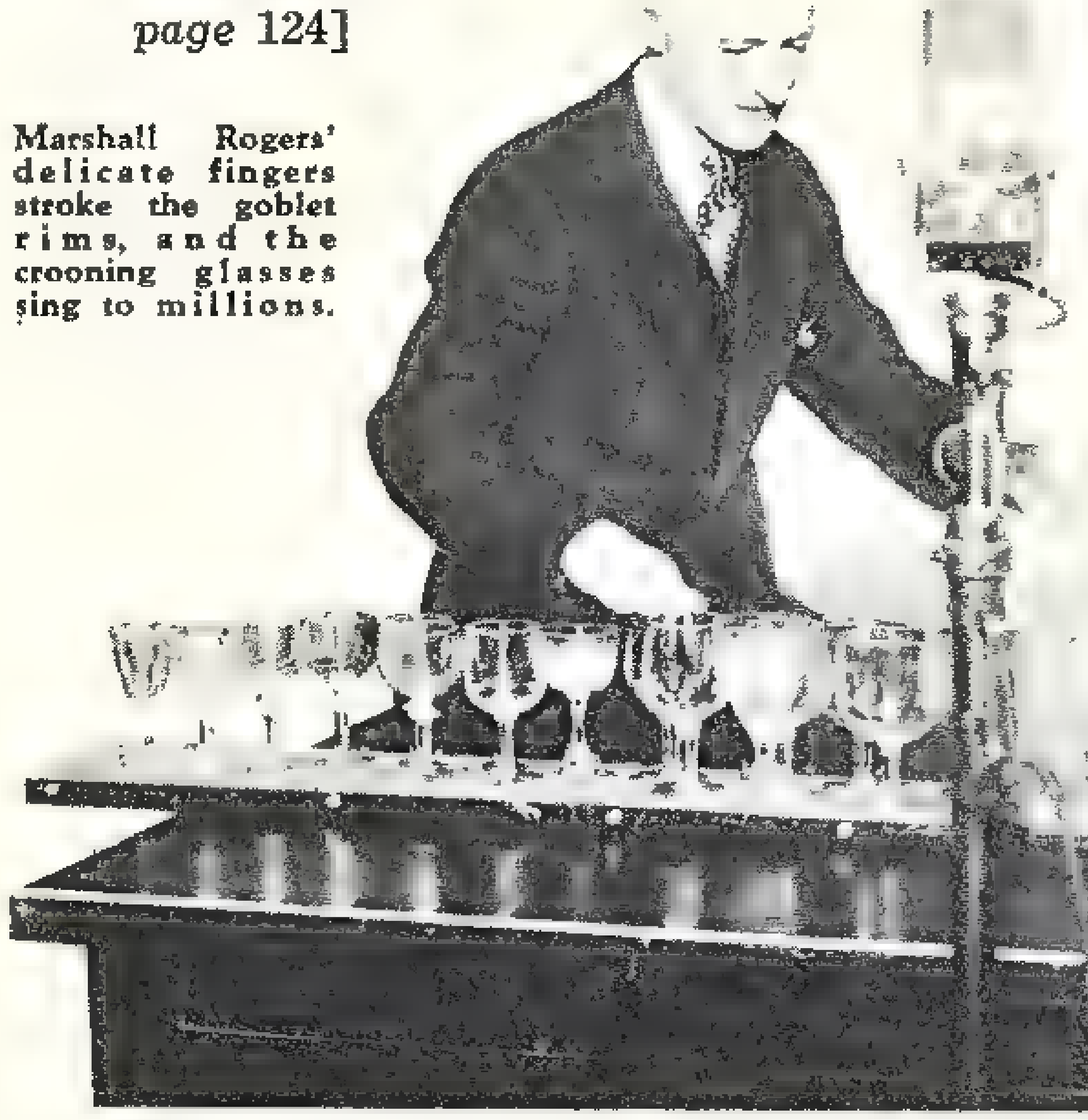
Window glass takes the place of customary metal

[*Continued on page* 124]



A bow, a broom, a wire and a box for a sound chamber brought Victor Lundgren fame for his ingenuity.

If the flagpoles Steeple Jack Kay painted were laid end to end, they wouldn't reach half so far as did his remote control type of harmonica playing when the Major put him on the air to win plaudits for his utterly unique style in piped music. He doesn't paint flagpoles now

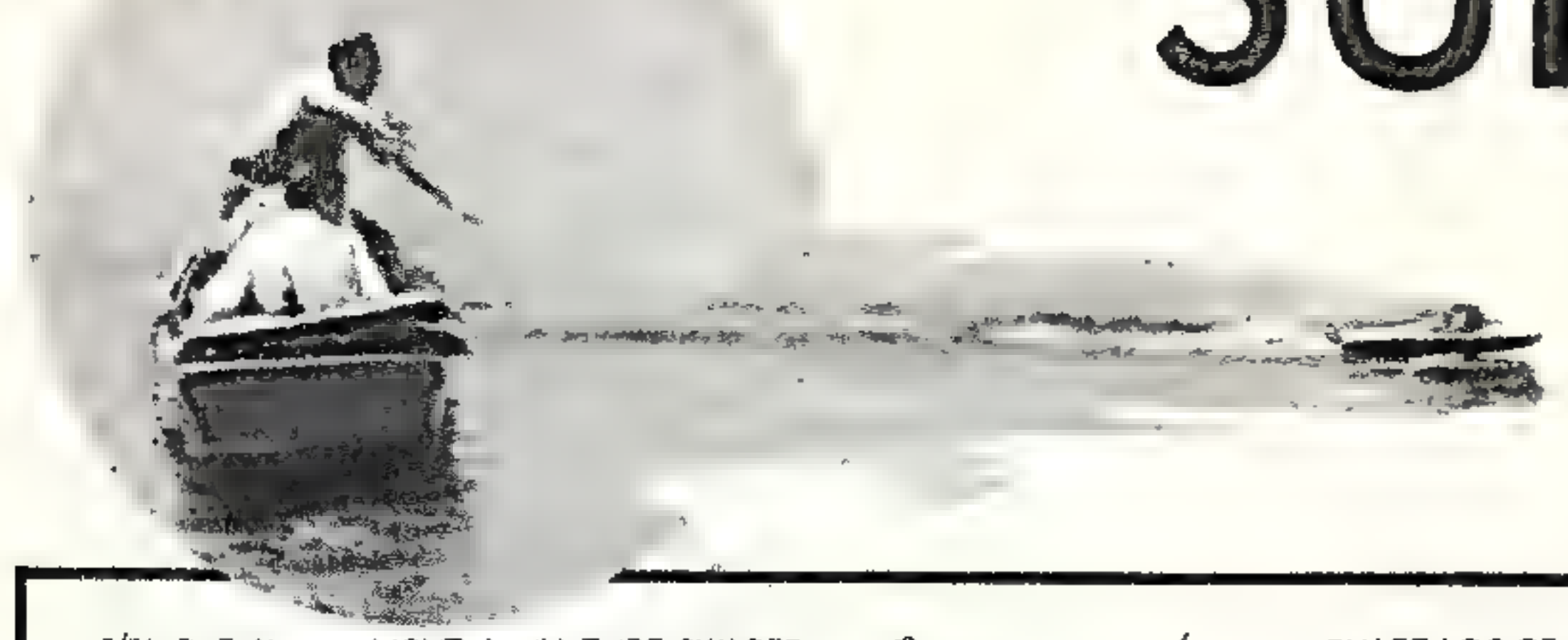


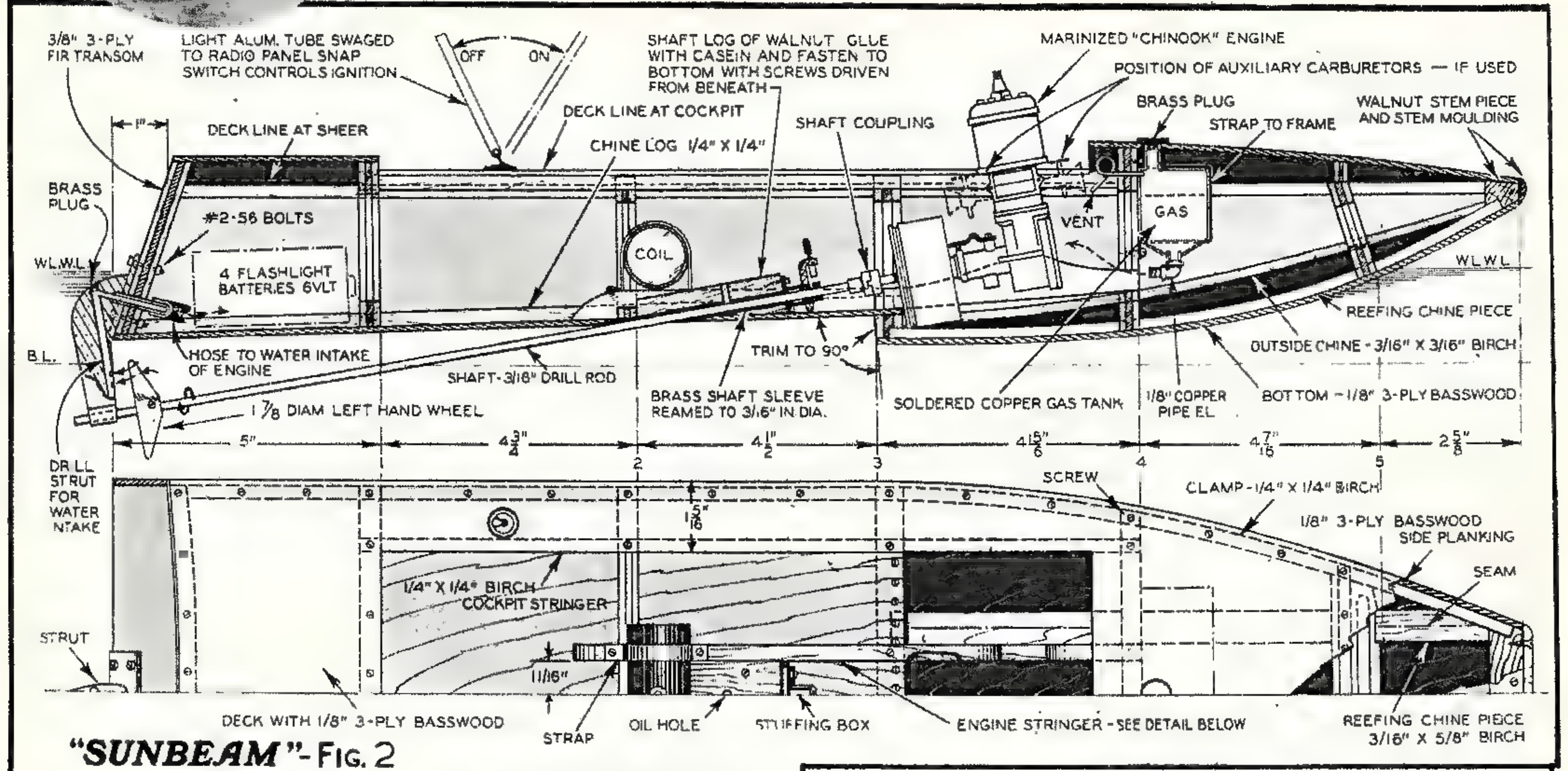
Marshall Rogers' delicate fingers stroke the goblet rims, and the crooning glasses sing to millions.

"SUNBEAM"—a Flashing MODEL Raceboat

by WESTON FARMER

Powered with the MM "Chinook" this model hydroplane offers model fans new thrills.




3/8" 3-PLY FIR TRANSOM
LIGHT ALUM. TUBE SWAGED TO RADIO PANEL SNAP SWITCH CONTROLS IGNITION
OFF
ON
SHAFT LOG OF WALNUT GLUE WITH CASEIN AND FASTEN TO BOTTOM WITH SCREWS DRIVEN FROM BENEATH
MARINIZED "CHINOOK" ENGINE
POSITION OF AUXILIARY CARBURETORS — IF USED
DECK LINE AT COCKPIT
BRASS PLUG
STRAP TO FRAME
WALNUT STEM PIECE AND STEM MOULDING
1"
DECK LINE AT SHEER
CHINE LOG 1/4" X 1/4"
SHAFT COUPLING
BRASS PLUG
#2-56 BOLTS
VENT
GAS
COIL
WL.W.L.
4 FLASHLIGHT BATTERIES 6VLT
WLWL
REEFING CHINE PIECE
B.L.
HOSE TO WATER INTAKE OF ENGINE
TRIM TO 90°
OUTSIDE CHINE - 3/16" X 3/16" BIRCH
SHAFT-3/16" DRILL ROD
BRASS SHAFT SLEEVE REAMED TO 3/16" IN DIA.
SOLDERED COPPER GAS TANK
1/8" COPPER PIPE EL
BOTTOM - 1/8" 3-PLY BASSWOOD
1 7/8 DIAM LEFT HAND WHEEL
5"
4 3/4"
4 1/2"
4 15/16"
4 7/16"
2 5/8"
2
3
4
5
DRILL STRUT FOR WATER INTAKE
SCREW
CLAMP - 1/4" X 1/4" BIRCH
1 5/16"
1/8" 3-PLY BASSWOOD SIDE PLANKING
SEAM
1/4" X 1/4" BIRCH COCKPIT STRINGER
STRUT
11/16"
DECK WITH 1/8" 3-PLY BASSWOOD
STRAP
OIL HOLE
STUFFING BOX
ENGINE STRINGER - SEE DETAIL BELOW
REEFING CHINE PIECE 3/16" X 5/8" BIRCH

"SUNBEAM"-FIG. 2

SCALE IN INCHES
0 1 2 3 4 5 6

NOTE-ALL FRAMES 3/8" PLYWOOD EXCEPT AT STEP FRAME WHICH IS OF 1/2" PLYWOOD. USE 1/2" #3 FLAT HD BRASS OR COPPER SCREWS THRUOUT

In building "Sunbeam" follow the plans carefully paying close attention to the various dimensions. The above cross section diagram clearly shows the arrangement of the hull as well as the location of miniature engine and ignition system.

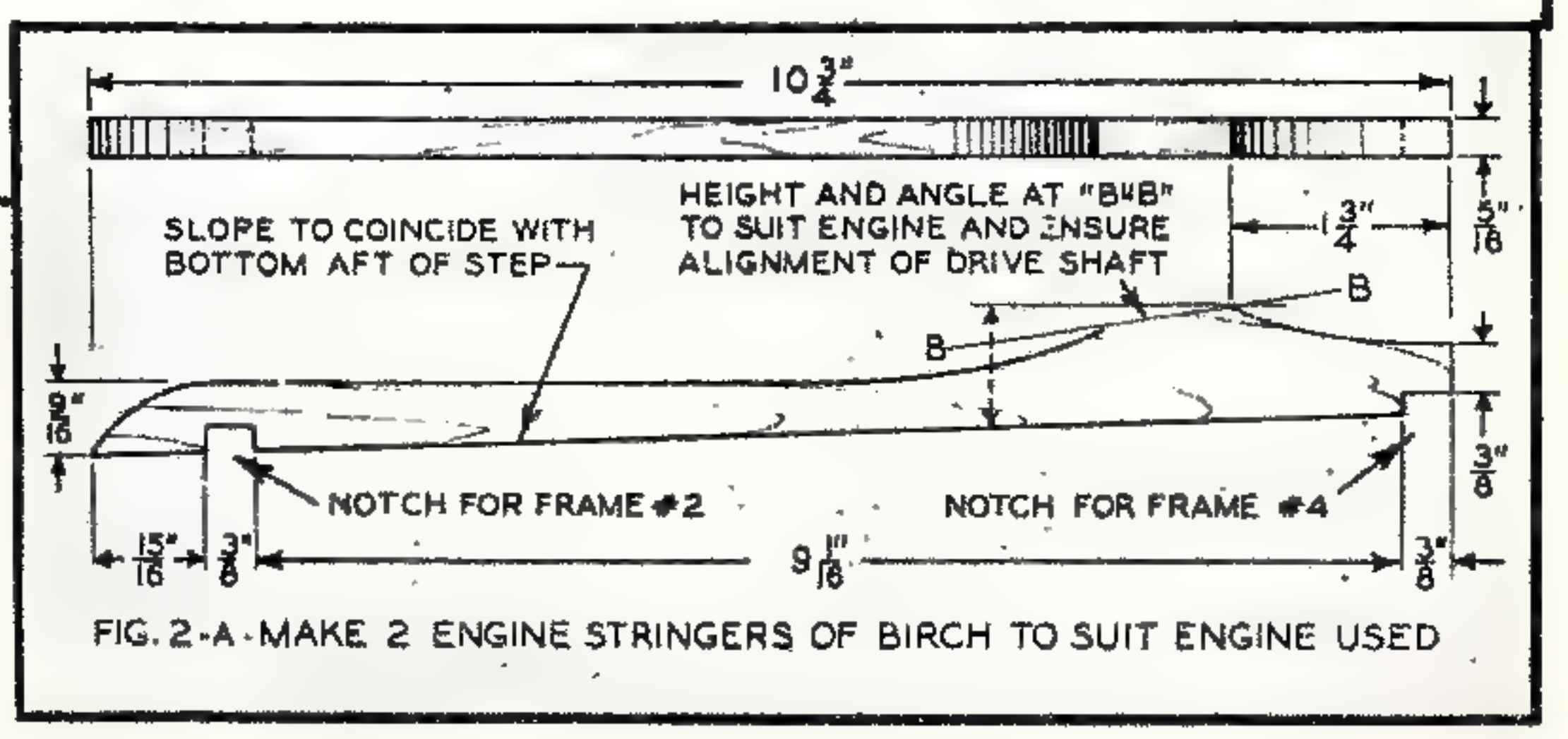

10 3/4"
HEIGHT AND ANGLE AT "B-B" TO SUIT ENGINE AND ENSURE ALIGNMENT OF DRIVE SHAFT
SLOPE TO COINCIDE WITH BOTTOM AFT OF STEP
1 3/4"
5/16"
B
B
9/16"
3/8"
NOTCH FOR FRAME #2
NOTCH FOR FRAME #4
15/16"
3/8"
9 1/16"
3/8"

FIG. 2-A-MAKE 2 ENGINE STRINGERS OF BIRCH TO SUIT ENGINE USED

NOTHING affords more pleasure than to see a model hydroplane, built by your own hands go skimming through the water in a most realistic manner. Powered by "Chinook," the miniature gasoline engine described in the May issue of MODERN MECHANIX & INVENTIONS, "Sunbeam," as the model raceboat has been named, is the last word in model marine craft.

The construction of the hull is not at all difficult as one will learn after examining the detailed plans. Birch and 3-ply basswood are used to form stringers, frames and incidental parts.

To begin actual construction first reproduce the lines drawing full size on a drawing board, then draw out the patterns for the frames, deducting 1/8" all around for the 1/8" plywood basswood planking which is used. A keel pattern board must be cut out to space the frames and to keep them aligned while you are screwing on the side planks. Line the keel pattern board up on the drawing board as shown in the sketch, Fig. 1, and the frames are then put in as progressively shown. The transom is solid, of course, and is beveled for the proper rake before being temporarily fastened by brads to the keel pattern board. Attach the walnut nose piece to the keel pattern board, which can be of 3/4" scrub stock, and then put in the sheer clamps and the chine logs. The construction of the frame at the step has been made clear in the drawings. Use 3/8" No. 3 flathead brass screws for the planking, or 1/2" size if screwing into end grain in the plywood frames.

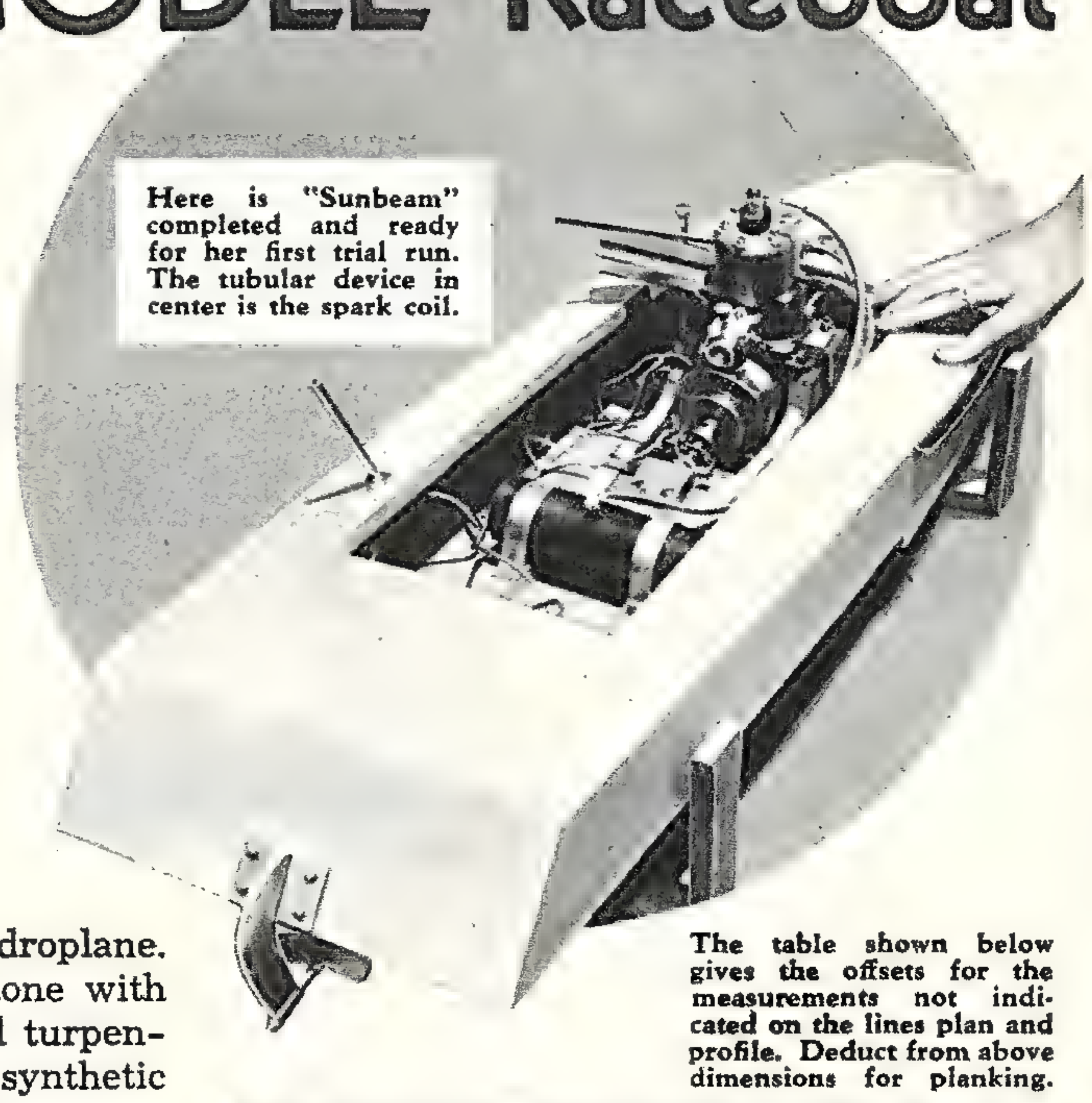
The sides are attached to the chine log and sheer clamp with screws spaced about 1 1/4" on centers. Thick casein glue is also used in attaching the sides to the clamp and chine. Being waterproof it will prevent leaks.

Next the bottom aft is put on. This is a simple operation, but it might be wise to state that all the holes for the screws must first be drilled with a root diameter drill to a depth of 1/4" in order to prevent splitting. Countersink the screw heads flush with a rosette.

The crown is cut into the aft formers. Forward, separate crown formers must be made and as these will take some fitting and beveling to get them right, they should be made as separate pieces, later to be glued. A former is used to determine the proper crown for the hydroplane.

Painting of the hull should be done with priming coats of half boiled oil and turpentine. When dry, sand, and apply synthetic auto enamel in colors desired. The original "Sunbeam," as shown in photos, was painted a buff cream.

While construction of hull is quite simple some explanation as to "Sunbeam's" operation is in order. First, you will notice that the boat has no rudder. Since it is operated from a central stake or tethering boat moored in



Here is "Sunbeam" completed and ready for her first trial run. The tubular device in center is the spark coil.

The table shown below gives the offsets for the measurements not indicated on the lines plan and profile. Deduct from above dimensions for planking.

TABLE OF OFFSETS FOR DIMENSIONS NOT SHOWN ON LINES PLAN — OFFSETS TO OUTSIDE OF PLANKING

FRAME NO. →	TRANSOM	3	4	5	STEM
AFT CHINE	1/2"	29/32"			
OUTSIDE CHINE		1/2	1 3/32	2 3/32	2 15/16"
REEFING CHINE		3/8"	17/32"	1 19/32"	2 15/16
SHEER LINE	3 7/16	3 7/16	3 7/16	3 7/16	3 7/16

NOTE: HEIGHTS ABOVE BASELINE: DEDUCT FOR PLANKING

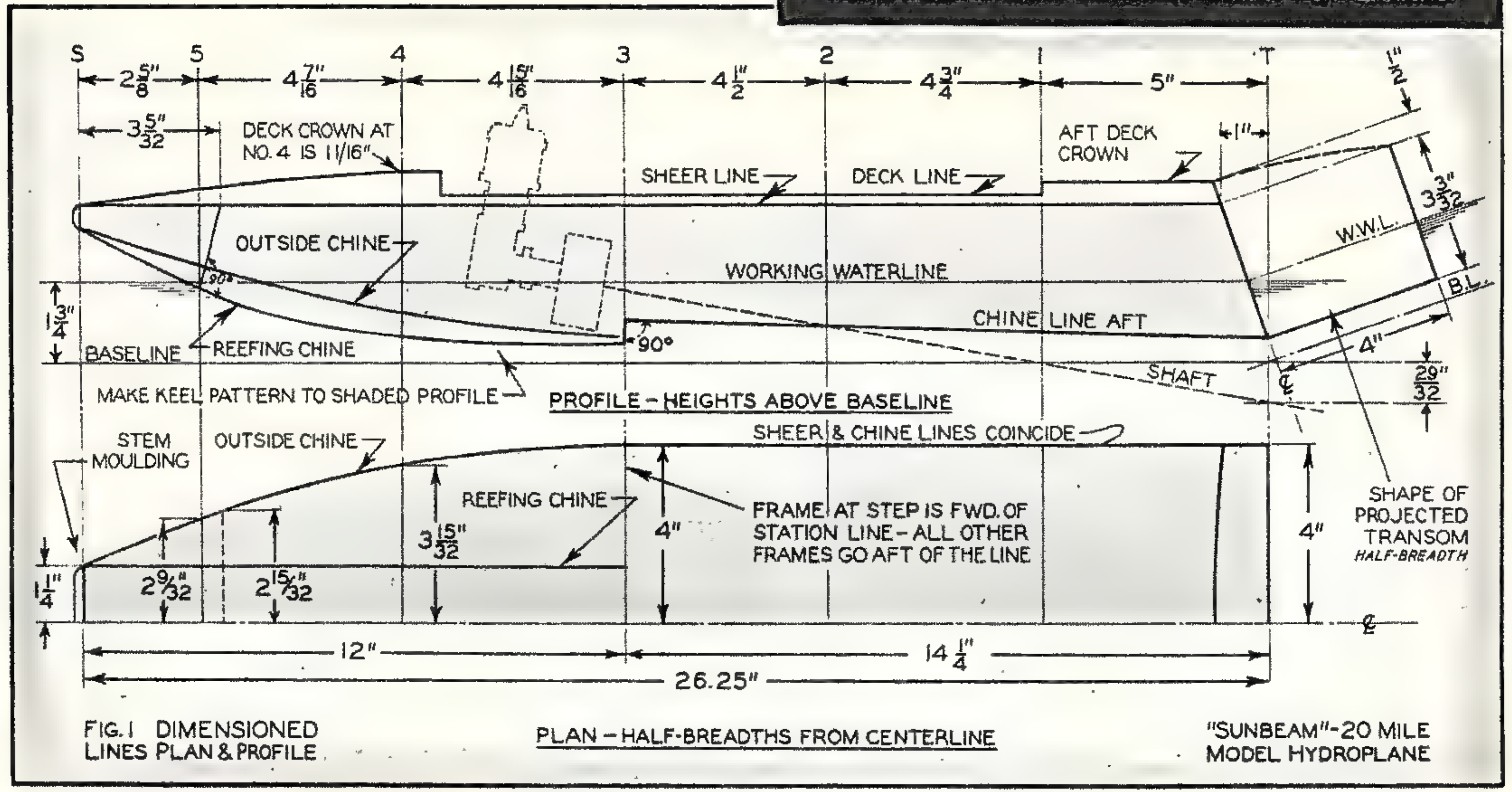

S
5
4
3
2
1
T
2 5/8"
4 7/16"
4 15/16"
4 1/2"
4 3/4"
5"
1/2"
3 5/32"
DECK CROWN AT NO. 4 IS 11/16"
AFT DECK CROWN
1"
SHEER LINE
DECK LINE
3 3/32"
W.W.L.
OUTSIDE CHINE
90°
WORKING WATERLINE
B.L.
CHINE LINE AFT
1 3/4"
BASELINE
REEFING CHINE
90°
4"
SHAFT
29/32"
MAKE KEEL PATTERN TO SHADED PROFILE
PROFILE - HEIGHTS ABOVE BASELINE
SHEER & CHINE LINES COINCIDE
STEM MOULDING
OUTSIDE CHINE
REEFING CHINE
3 15/32"
4"
FRAME AT STEP IS FWD. OF STATION LINE - ALL OTHER FRAMES GO AFT OF THE LINE
4"
SHAPE OF PROJECTED TRANSOM HALF-BREADTH
1 1/4"
2 9/32"
2 15/32"
12"
14 1/4"
26.25"
PLAN - HALF-BREADTHS FROM CENTERLINE
"SUNBEAM"-20 MILE MODEL HYDROPLANE

FIG. 1 DIMENSIONED LINES PLAN & PROFILE

The lines drawing should be reproduced full size on drawing paper according to the above measurements before starting any actual construction. Note that the placement of frame at step is forward of the station line while all other frames are aft.

Lay Out Plans To Full Size Before Building

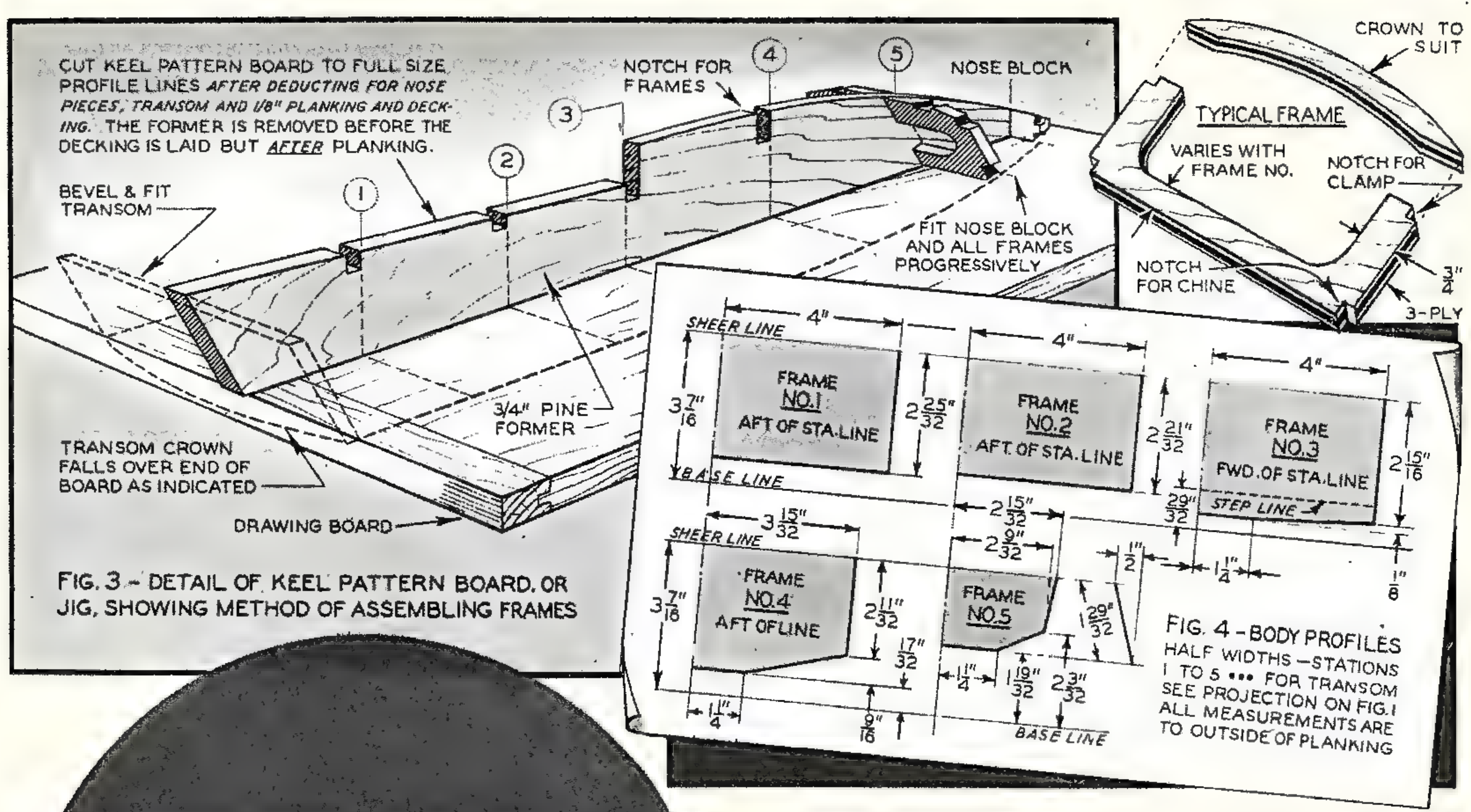
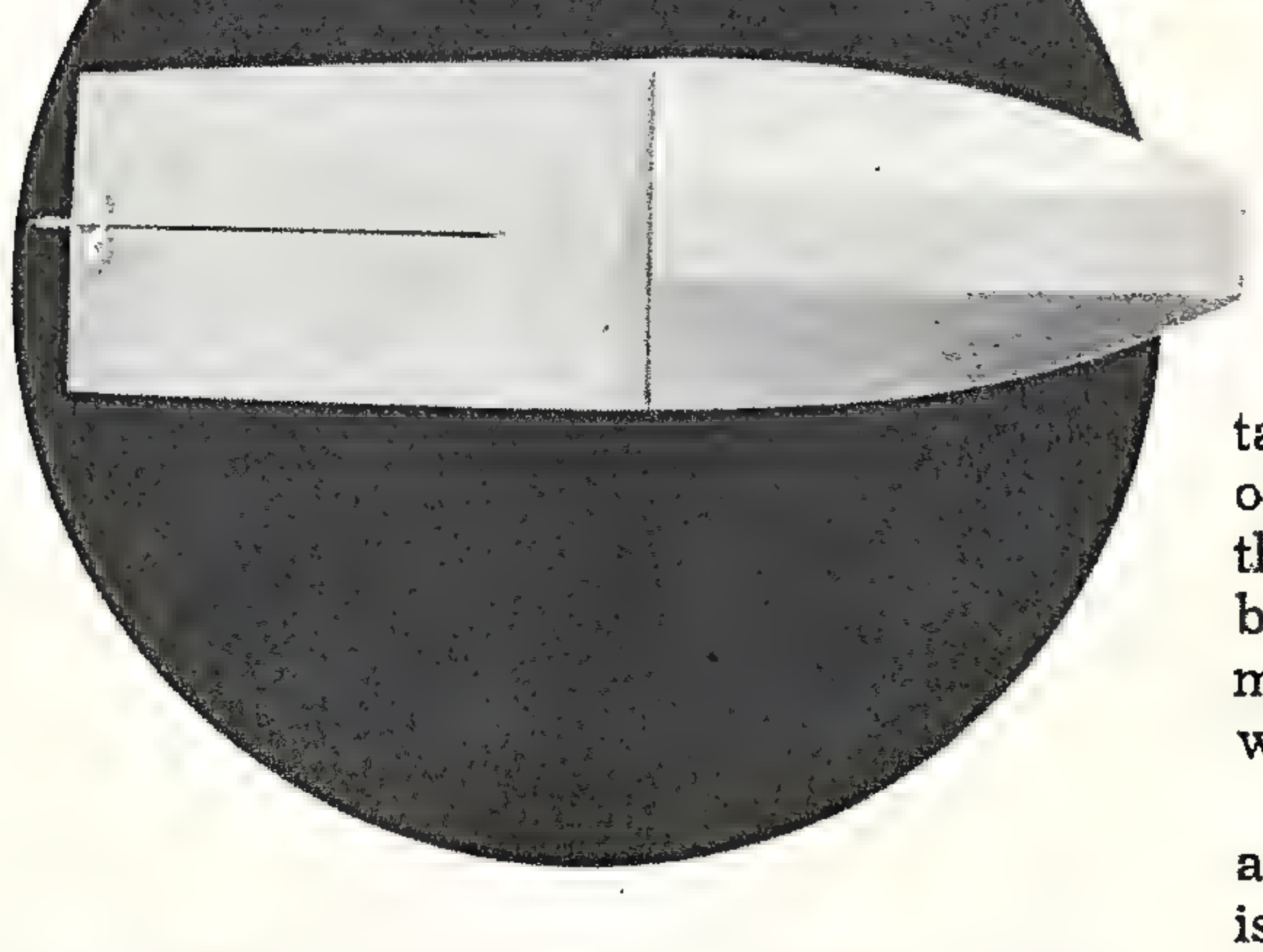

CUT KEEL PATTERN BOARD TO FULL SIZE. PROFILE LINES AFTER DEDUCTING FOR NOSE PIECES, TRANSOM AND 1/8" PLANKING AND DECKING. THE FORMER IS REMOVED BEFORE THE DECKING IS LAID BUT AFTER PLANKING.
NOTCH FOR FRAMES
NOSE BLOCK
BEVEL & FIT TRANSOM
1
2
3
4
5
FIT NOSE BLOCK AND ALL FRAMES PROGRESSIVELY
3/4" PINE FORMER
TRANSOM CROWN FALLS OVER END OF BOARD AS INDICATED
DRAWING BOARD
CROWN TO SUIT
TYPICAL FRAME
VARIES WITH FRAME NO.
NOTCH FOR CLAMP
NOTCH FOR CHINE
3/4"
3-PLY
SHEER LINE
BASE LINE
FRAME NO.1 AFT OF STA. LINE
FRAME NO.2 AFT OF STA. LINE
FRAME NO.3 FWD. OF STA. LINE
FRAME NO.4 AFT OF LINE
FRAME NO.5
STEP LINE
4"
3 7/16"
2 25/32"
2 21/32"
2 15/16"
3 15/32"
2 15/32"
2 9/32"
29/32"
1/2"
1/4"
1/8"
3 1/16"
2 11/32"
17/32"
1 29/32"
1/4"
1 19/32"
2 3/32"
1/4"
9/16"

FIG. 3 - DETAIL OF KEEL PATTERN BOARD, OR JIG, SHOWING METHOD OF ASSEMBLING FRAMES

FIG. 4 - BODY PROFILES HALF WIDTHS - STATIONS 1 TO 5 ••• FOR TRANSOM SEE PROJECTION ON FIG. 1 ALL MEASUREMENTS ARE TO OUTSIDE OF PLANKING



Above is shown the detailed diagram for the keel pattern board. Cut this according to the dimensions of the keel profile pieces deducting for nose pieces, transom and 1/8" planking and decking. Bottom of finished hull is shown.

the middle of a lake, and a cord, such as a stout fishline, is hooked with a brass leader into the brass rail at the starboard side, a rudder is not required. The engine is started up and the craft gently lowered into the water. A good push sets it into motion after which the line is paid out for about fifty feet. A fishing reel mounted on a stub pole is excellent for this purpose. When the gas runs out the boat can be reeled in.

Should the cord break, or should you wish to stop the boat before the run is finished, an ignition switch on the side of the decking allows a cord or a pole to be used in swiping off the ignition in emergencies. The switch is a radio toggle type with a tubular extension. Cooling water for the engine is obtained preferably through the strut. The strut can be drilled as shown, and a tube led through the transom, from which a rubber hose is used to carry water to the jacket intake of the engine. From the jacket it is piped overboard. Although a scoop can be used the strut idea has the advantage of the engine being cooled even though the boat is not in motion. Without the strut scoop the motor will heat when running at a dock.

Ignition for the motor is supplied by an aero model spark coil. Current for the coil is obtained from four flashlight cells wired in series and soldered at the contacts to give six volts.

If the popular Duplex carburetion is used, several changes are required. One is the matter of forcing fuel to the carburetors, which in this case are higher than the fuel. To do this a rubber tube is run from the goose neck vent in the gas tank, to a small balloon which has previously been blown up by lung power to give one to two pounds above atmospheric pressure. This will keep gas at the needle valve. In the orginal carbureting system, as shown with the aero engine, no balloon is necessary.

The method of laying out the screw propeller is shown in the drawing. Be sure your wheel is a "true screw" wheel, with all parts of the blade advancing at the same pitch, so that in one turn all points would travel the same distance no matter what their radii from the hub. By using the method of layout in the drawing you assure this. The wheel can be cast as shown in the diagrams, using old piston alloy stock out from junk autos for metal, or you may build up props silver soldering hammered blades to a brass hub as the drawing shows.

Should you wish a variable spark control it can be arranged by making a timer as shown in cross section on the inboard profile and in the detail drawings. This will make the engine a bit easier to start and offer the advantage of a controllable speed. In the Chinook aero the timing is fixed. In case the stuffing box timer is used the wiring is of course led to it according to the wiring diagram after which the ordinary timer becomes inoperative. The engine is started by winding a cord around the flywheel in strop fashion.

For fuel, lubricating oil is mixed with the gasoline to the ratio of about 1/3 pint to each quart. Use heavy oil, and high test gas for best results.

Jig Saw Aids In Making Smaller Parts For "SUNBEAM"

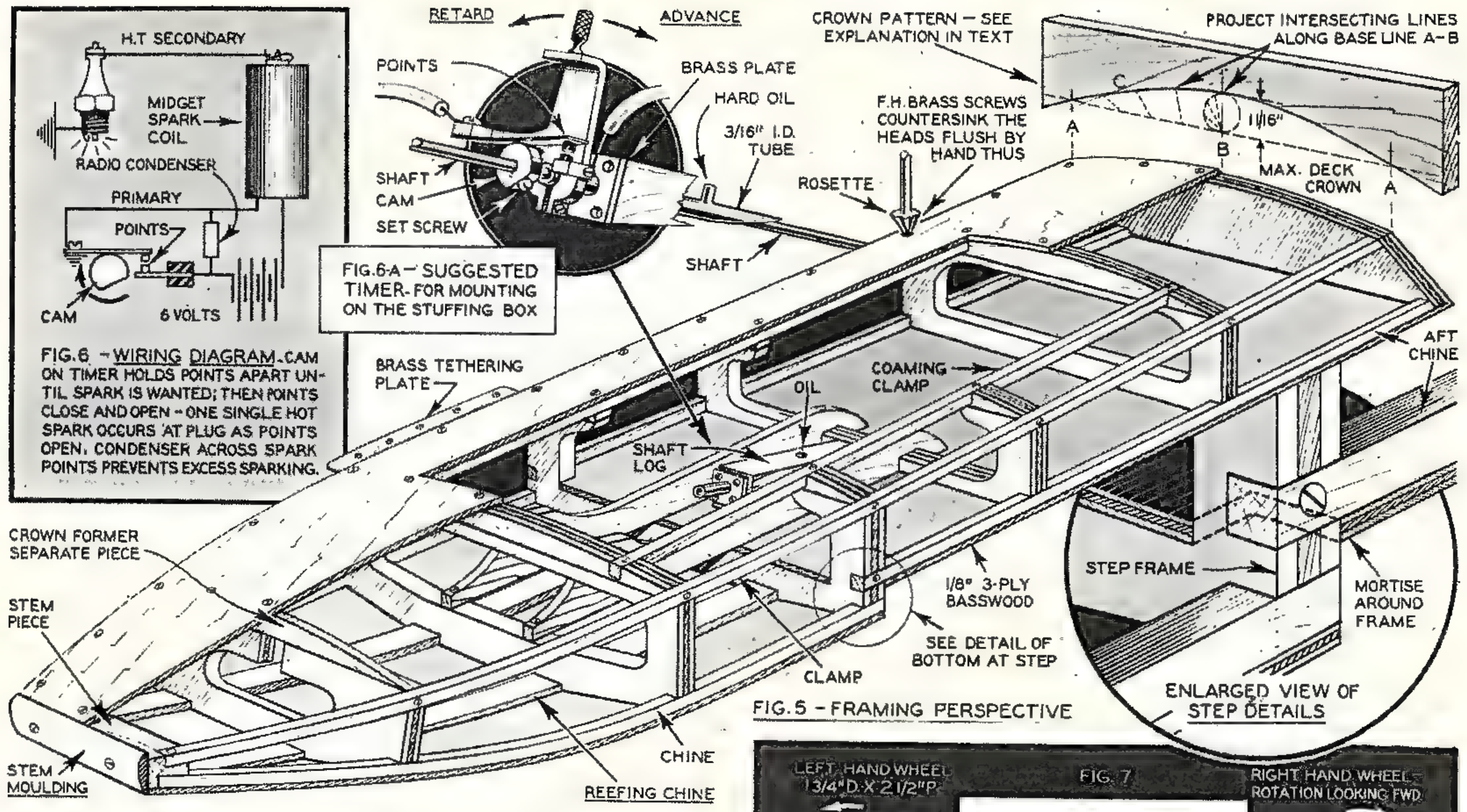

H.T. SECONDARY
MIDGET SPARK COIL
RADIO CONDENSER
PRIMARY
POINTS
CAM
6 VOLTS
RETARD
ADVANCE
POINTS
BRASS PLATE
HARD OIL
3/16" I.D. TUBE
SHAFT
CAM
SET SCREW
SHAFT
CROWN PATTERN - SEE EXPLANATION IN TEXT
F.H. BRASS SCREWS COUNTERSINK THE HEADS FLUSH BY HAND THUS
ROSETTE
PROJECT INTERSECTING LINES ALONG BASE LINE A-B
1/16"
MAX. DECK CROWN
A
B
C
AFT CHINE
BRASS TETHERING PLATE
COAMING CLAMP
OIL
SHAFT LOG
CROWN FORMER SEPARATE PIECE
STEM PIECE
STEM MOULDING
1/8" 3-PLY BASSWOOD
SEE DETAIL OF BOTTOM AT STEP
CLAMP
CHINE
REEFING CHINE
STEP FRAME
MORTISE AROUND FRAME

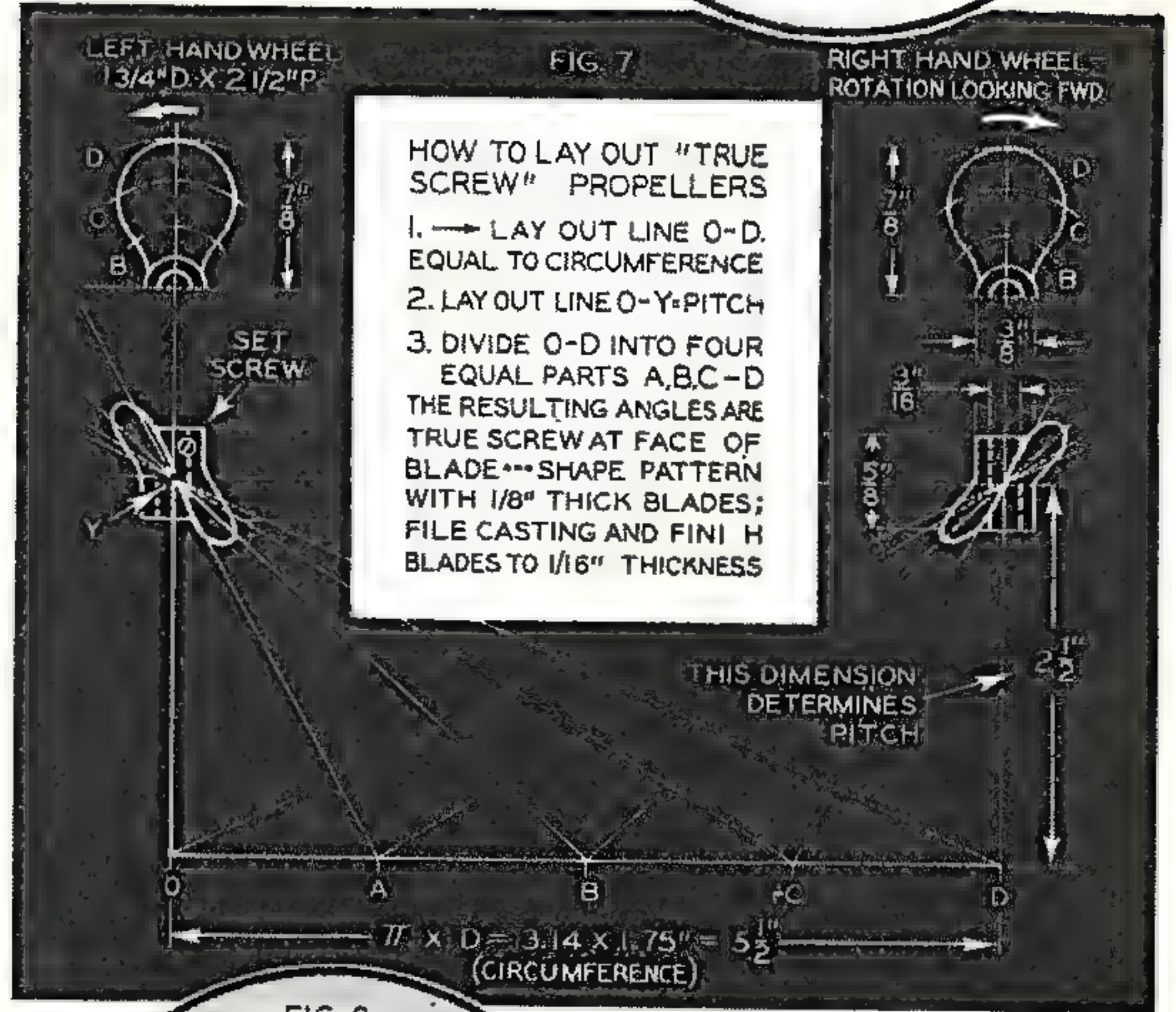
FIG. 6 - WIRING DIAGRAM - CAM ON TIMER HOLDS POINTS APART UNTIL SPARK IS WANTED; THEN POINTS CLOSE AND OPEN - ONE SINGLE HOT SPARK OCCURS AT PLUG AS POINTS OPEN. CONDENSER ACROSS SPARK POINTS PREVENTS EXCESS SPARKING.

FIG. 6-A - SUGGESTED TIMER FOR MOUNTING ON THE STUFFING BOX

FIG. 5 - FRAMING PERSPECTIVE

ENLARGED VIEW OF STEP DETAILS

This is the appearance of the hull after the framing has been completed. Crown pieces are glued in place over the frames to form a rigid support for attaching deck. For best results use a jig or coping saw for cutting frame and crown pieces.


LEFT HAND WHEEL 1 3/4" D. X 2 1/2" P.
FIG. 7
RIGHT HAND WHEEL - ROTATION LOOKING FWD.
SET SCREW
THIS DIMENSION DETERMINES PITCH
2 1/2"
7/8"
3/8"
3/16"
O
A
B
C
D
Y
π x D = 3.14 x 1.75" = 5 1/2" (CIRCUMFERENCE)

HOW TO LAY OUT "TRUE SCREW" PROPELLERS

1. → LAY OUT LINE O-D. EQUAL TO CIRCUMFERENCE
2. LAY OUT LINE O-Y = PITCH
3. DIVIDE O-D INTO FOUR EQUAL PARTS A,B,C-D THE RESULTING ANGLES ARE TRUE SCREW AT FACE OF BLADE ••• SHAPE PATTERN WITH 1/8" THICK BLADES; FILE CASTING AND FINISH BLADES TO 1/16" THICKNESS

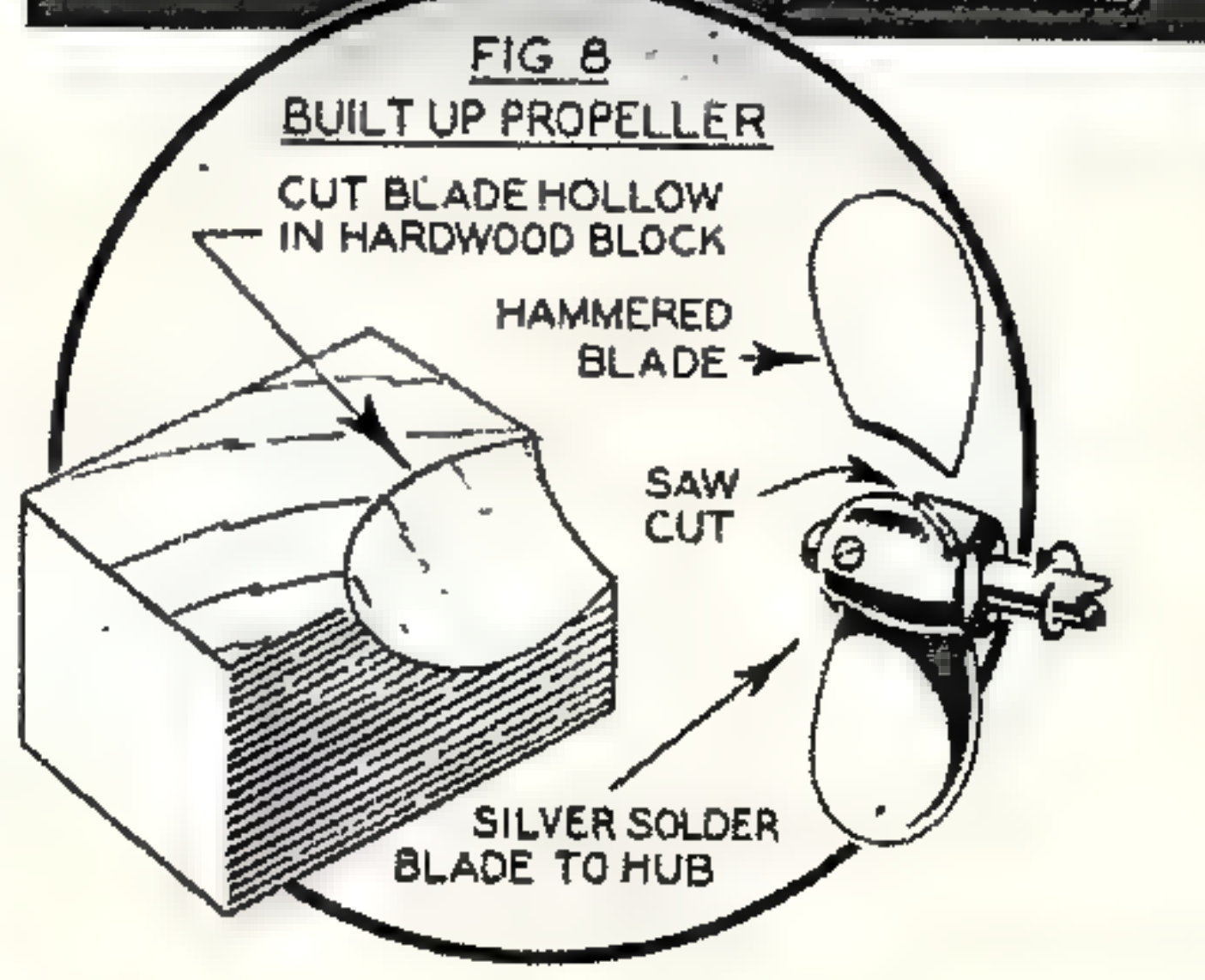
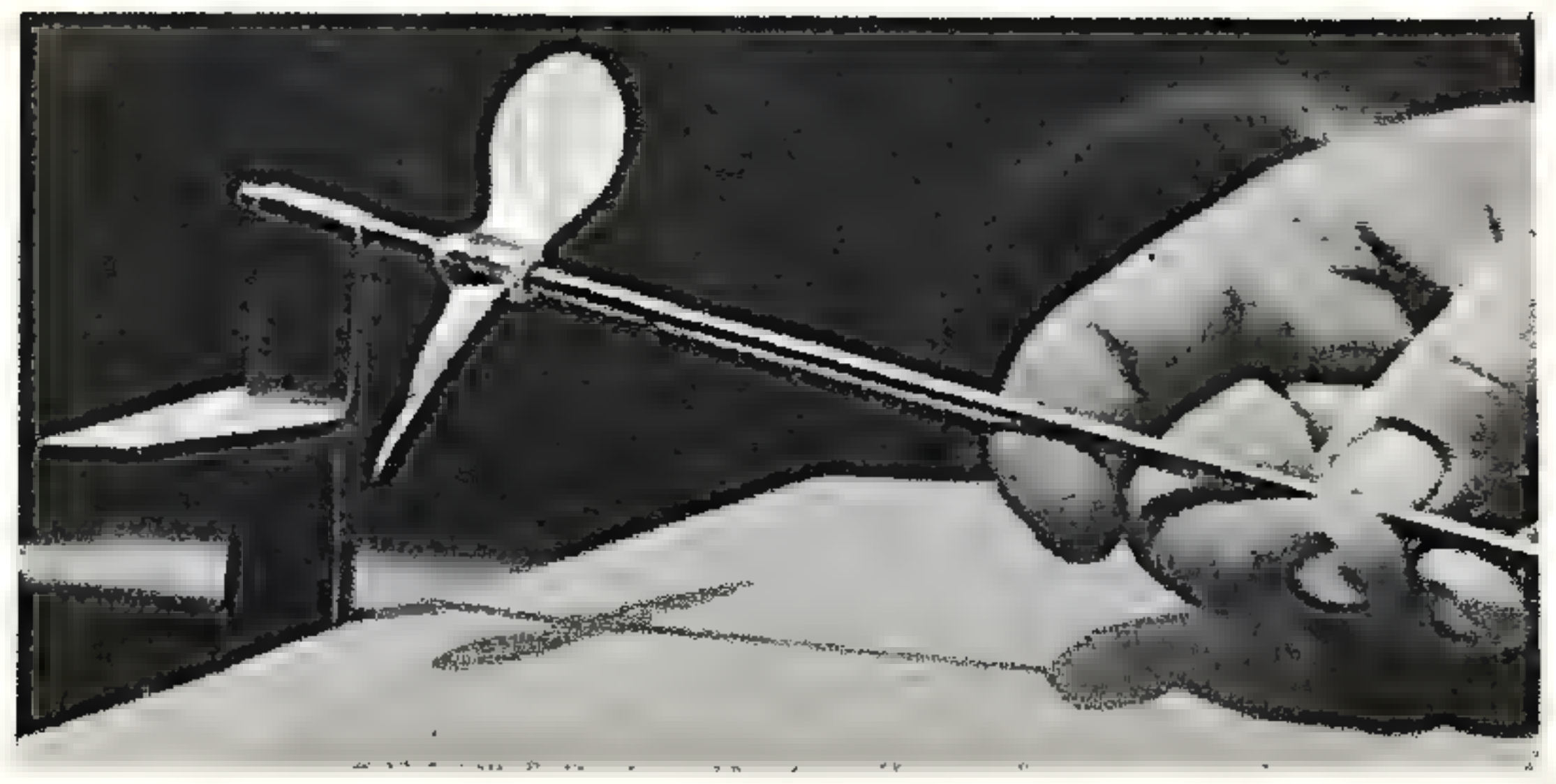

CUT BLADE HOLLOW IN HARDWOOD BLOCK
HAMMERED BLADE
SAW CUT
SILVER SOLDER BLADE TO HUB

FIG. 8 BUILT UP PROPELLER

Propeller is made as shown above by soldering hammered brass blades to the propeller hub. If desired the propeller may be cast from white metal although a great deal of care is needed to do this.

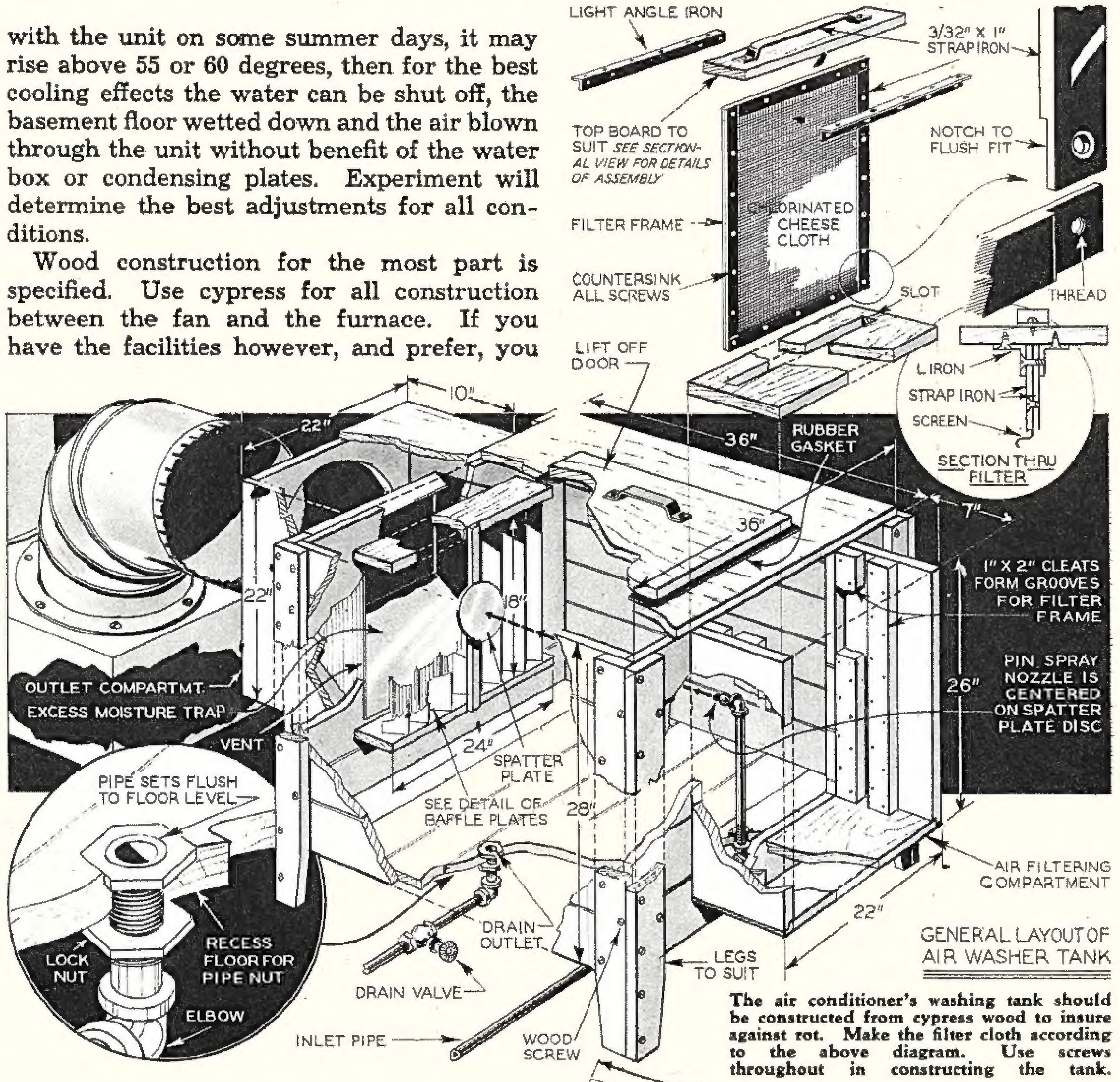


BLUEPRINTS FOR "SUNBEAM" SPEEDBOAT
Enlarged blueprint plans for building "Sunbeam" will greatly simplify construction. These plans are available at $1.00 postpaid. Order Blueprint No. M-412, Modern Mechanix Publ. Co., Greenwich, Conn.

Air Conditioner Sends Cool Breezes Through Heater Pipes

with the unit on some summer days, it may rise above 55 or 60 degrees, then for the best cooling effects the water can be shut off, the basement floor wetted down and the air blown through the unit without benefit of the water box or condensing plates. Experiment will determine the best adjustments for all conditions.

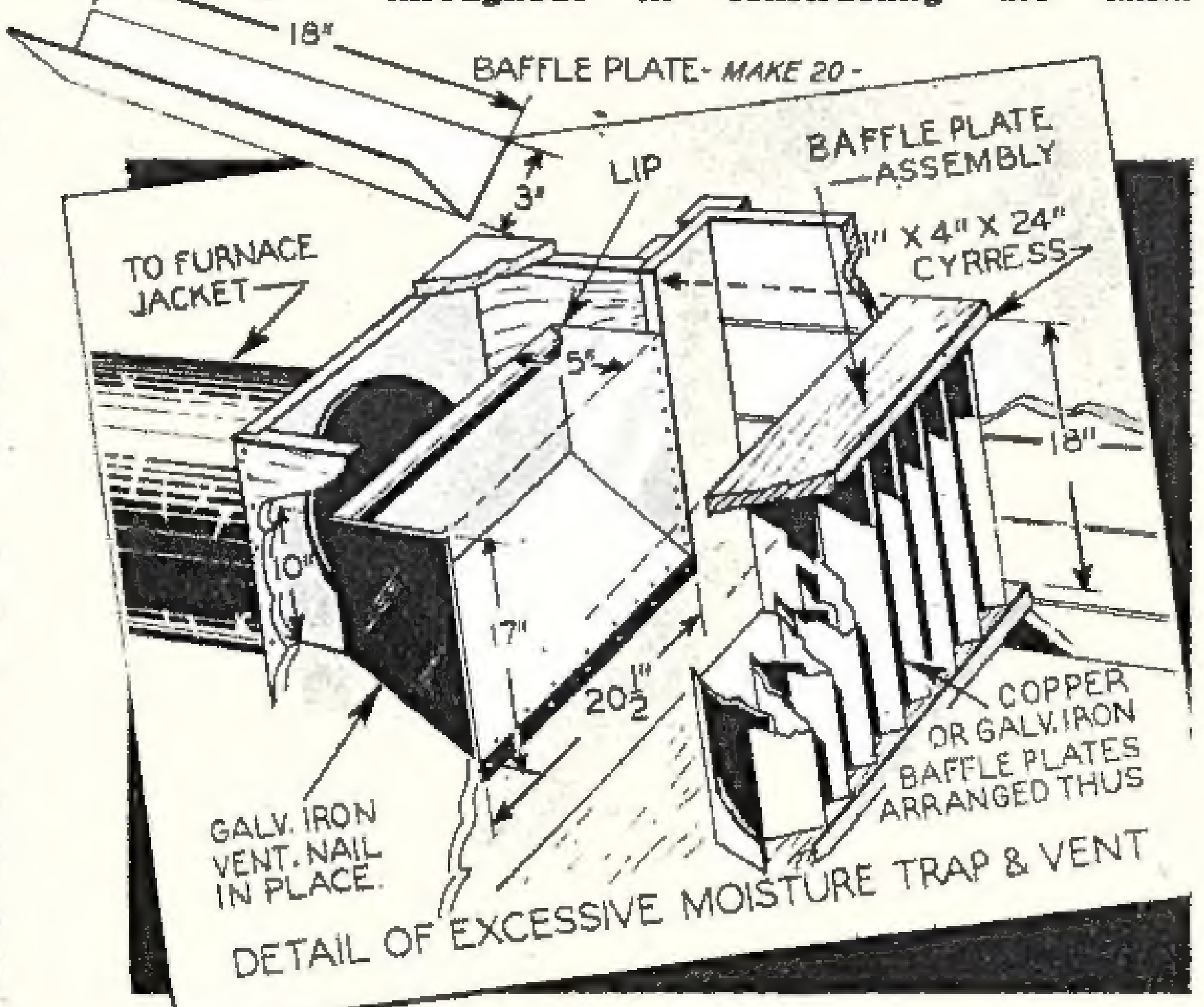
Wood construction for the most part is specified. Use cypress for all construction between the fan and the furnace. If you have the facilities however, and prefer, you can substitute galvanized iron for practically all of the sections.



LIGHT ANGLE IRON
3/32" X 1" STRAP IRON
TOP BOARD TO SUIT SEE SECTIONAL VIEW FOR DETAILS OF ASSEMBLY
NOTCH TO FLUSH FIT
FILTER FRAME
CHLORINATED CHEESE CLOTH
COUNTERSINK ALL SCREWS
SLOT
THREAD
LIFT OFF DOOR
L IRON
STRAP IRON
SCREEN
SECTION THRU FILTER
10"
22"
36"
RUBBER GASKET
36"
7"
22"
18"
1" X 2" CLEATS FORM GROOVES FOR FILTER FRAME
26"
PIN SPRAY NOZZLE IS CENTERED ON SPATTER PLATE DISC
OUTLET COMPARTMT.
EXCESS MOISTURE TRAP
VENT
24"
SPATTER PLATE
PIPE SETS FLUSH TO FLOOR LEVEL
SEE DETAIL OF BAFFLE PLATES
28"
AIR FILTERING COMPARTMENT
DRAIN OUTLET
22"
LOCK NUT
RECESS FLOOR FOR PIPE NUT
ELBOW
DRAIN VALVE
LEGS TO SUIT
INLET PIPE
WOOD SCREW
GENERAL LAYOUT OF AIR WASHER TANK

The air conditioner's washing tank should be constructed from cypress wood to insure against rot. Make the filter cloth according to the above diagram. Use screws throughout in constructing the tank.

Tongue and groove the boards for the top, sides, ends and bottom of the water compartment. They are 3 feet square and 26 to 28 inches high. The baffle or condenser plates are bent in "V" shape and installed, as shown. Directly in front of the baffle a hole is cut for the outlet compartment. The wet air draft passes between the off-set plates which condense the surplus moisture, and is then deflected upward by the galvanized iron vent which is nailed to the inside walls of the outlet compartment. A lip of galvanized iron is bent over as shown so that an occasional drop of water will be caught and thrown back into the water box. After passing through the vent the air enters the 16-inch pipe and on into the furnace jacket.



18"
BAFFLE PLATE- MAKE 20 -
3"
LIP
BAFFLE PLATE ASSEMBLY
TO FURNACE JACKET
1" X 4" X 24" CYPRESS
5"
18"
10"
17"
20½"
COPPER OR GALV. IRON BAFFLE PLATES ARRANGED THUS
GALV. IRON VENT. NAIL IN PLACE.
DETAIL OF EXCESSIVE MOISTURE TRAP & VENT

In order that the moisture does not pass into the furnace jacket a metal lip as shown above is installed directly behind baffle.

Pictorial Diagrams Aid In Simplyfying Construction

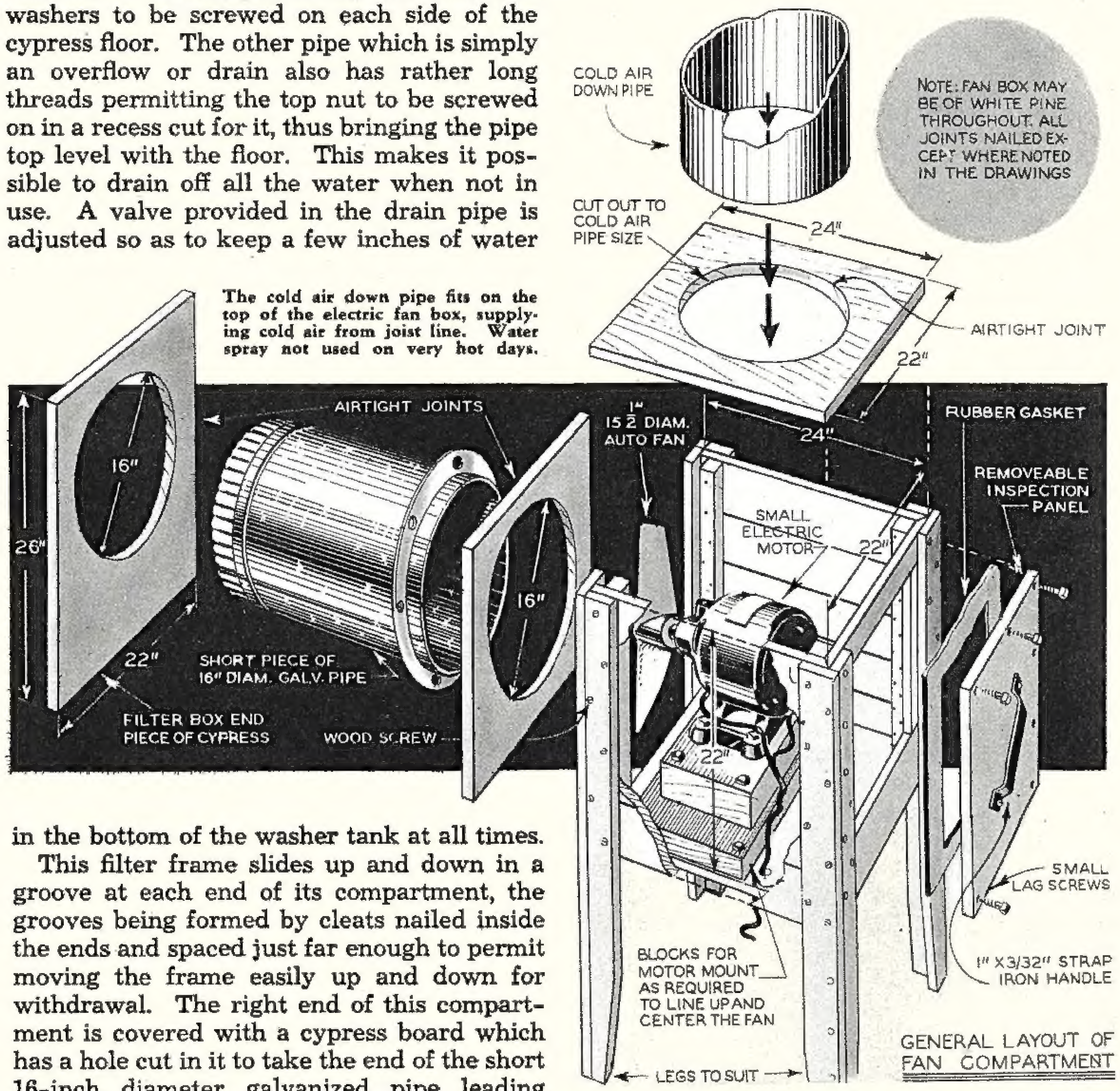
In the center of the baffle mount a strip for supporting a copper disc to form the spatter plate. The disc should be in direct line with the pin stream of water which issues from the spray nozzle. The tiny stream of water strikes the spatter plate and is broken into minute parts which cool and wet the air.

The piping comprises an inlet pipe near the right end of the water box of sufficient height that when the nozzle has been screwed on the pin stream is centered with the spatter plate. The lower end of the pipe is provided with 2 inches of thread, permitting thin nuts and washers to be screwed on each side of the cypress floor. The other pipe which is simply an overflow or drain also has rather long threads permitting the top nut to be screwed on in a recess cut for it, thus bringing the pipe top level with the floor. This makes it possible to drain off all the water when not in use. A valve provided in the drain pipe is adjusted so as to keep a few inches of water in the bottom of the washer tank at all times.

This filter frame slides up and down in a groove at each end of its compartment, the grooves being formed by cleats nailed inside the ends and spaced just far enough to permit moving the frame easily up and down for withdrawal. The right end of this compartment is covered with a cypress board which has a hole cut in it to take the end of the short 16-inch diameter galvanized pipe leading from the fan box.

The fan box can be made of white pine if desired, since no moisture of an excessive nature will be present here. A standard air fan can be mounted on the motor shaft, although a 2-bladed aluminum propeller fan is to be desired due to the high speed of the motor. A second-hand washing machine motor will do nicely for the power plant. It is essential, of course, to have the motor mounted on blocks to center the fan accurately. The blade tips should clear the sides of the galvanized pipe not more than ¼-inch all the way around. By providing small lag screws on the end of the motor box easy

[*Continued on page 122*]



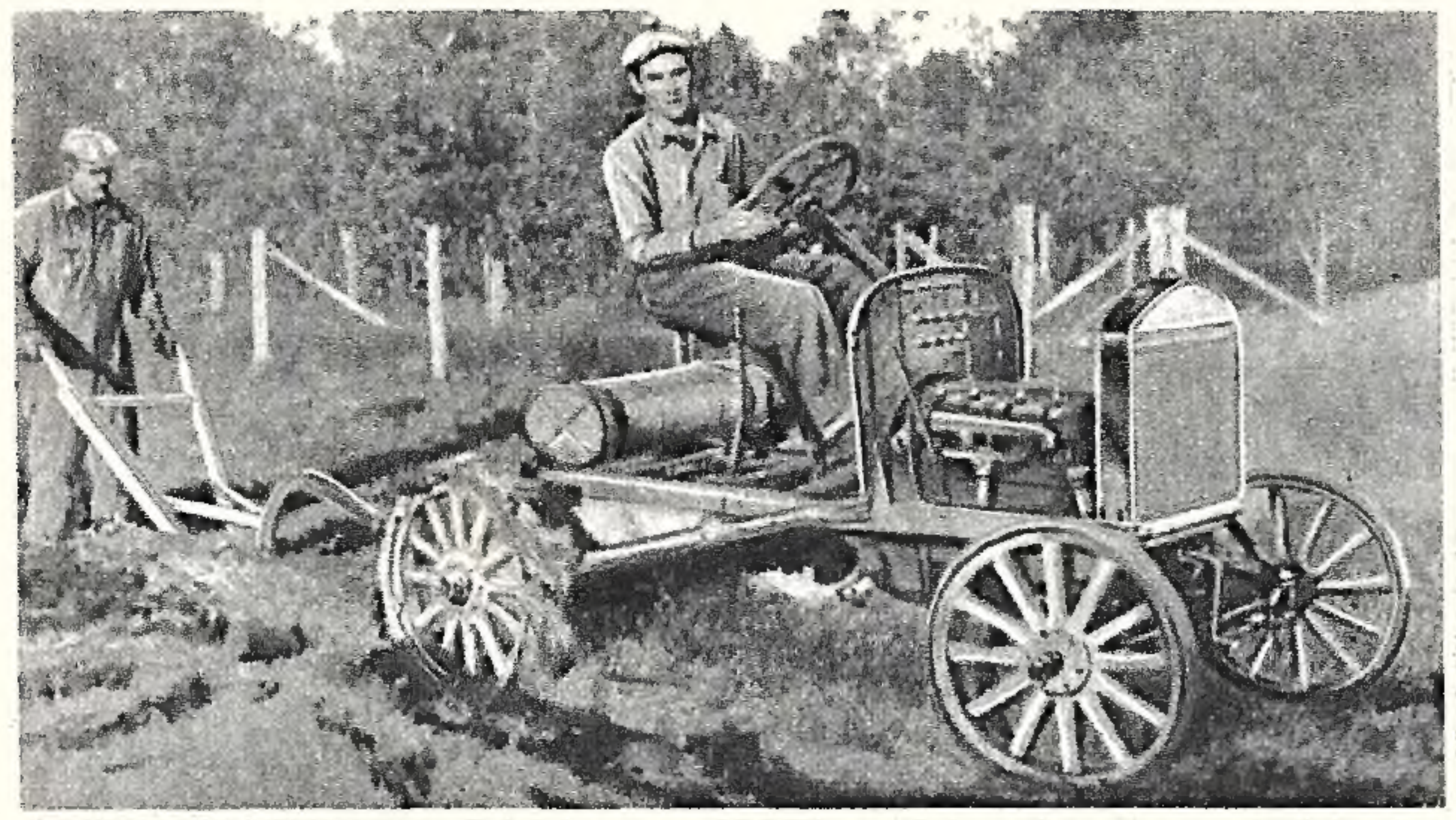
COLD AIR DOWN PIPE
NOTE: FAN BOX MAY BE OF WHITE PINE THROUGHOUT. ALL JOINTS NAILED EXCEPT WHERE NOTED IN THE DRAWINGS
CUT OUT TO COLD AIR PIPE SIZE
24"
AIRTIGHT JOINT
22"
AIRTIGHT JOINTS
1" 15½ DIAM. AUTO FAN
24"
RUBBER GASKET
16"
26"
16"
REMOVEABLE INSPECTION PANEL
SMALL ELECTRIC MOTOR
22"
22"
SHORT PIECE OF 16" DIAM. GALV. PIPE
22"
FILTER BOX END PIECE OF CYPRESS
WOOD SCREW
SMALL LAG SCREWS
1" X3/32" STRAP IRON HANDLE
BLOCKS FOR MOTOR MOUNT AS REQUIRED TO LINE UP AND CENTER THE FAN
LEGS TO SUIT
GENERAL LAYOUT OF FAN COMPARTMENT

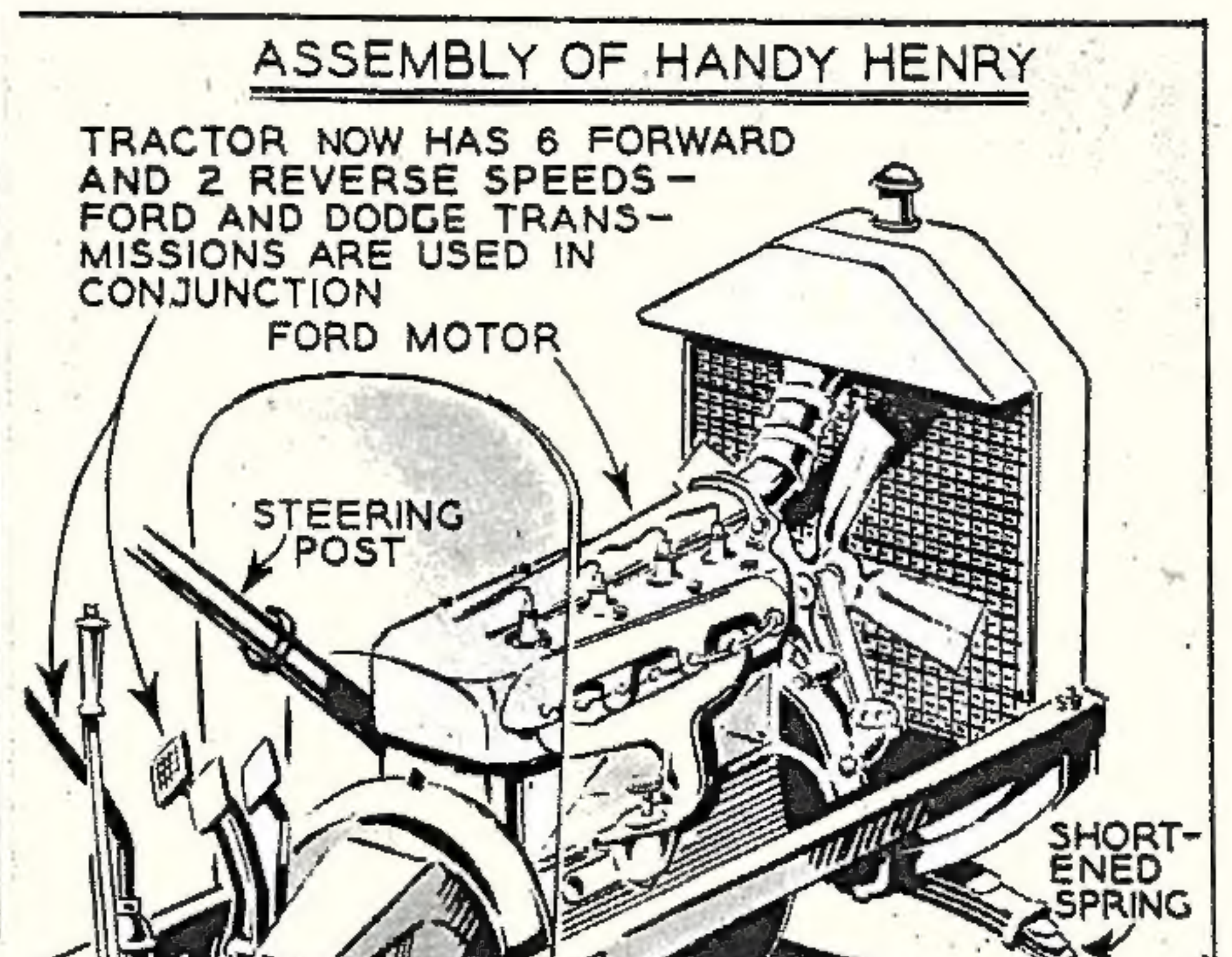
The cold air down pipe fits on the top of the electric fan box, supplying cold air from joist line. Water spray not used on very hot days.

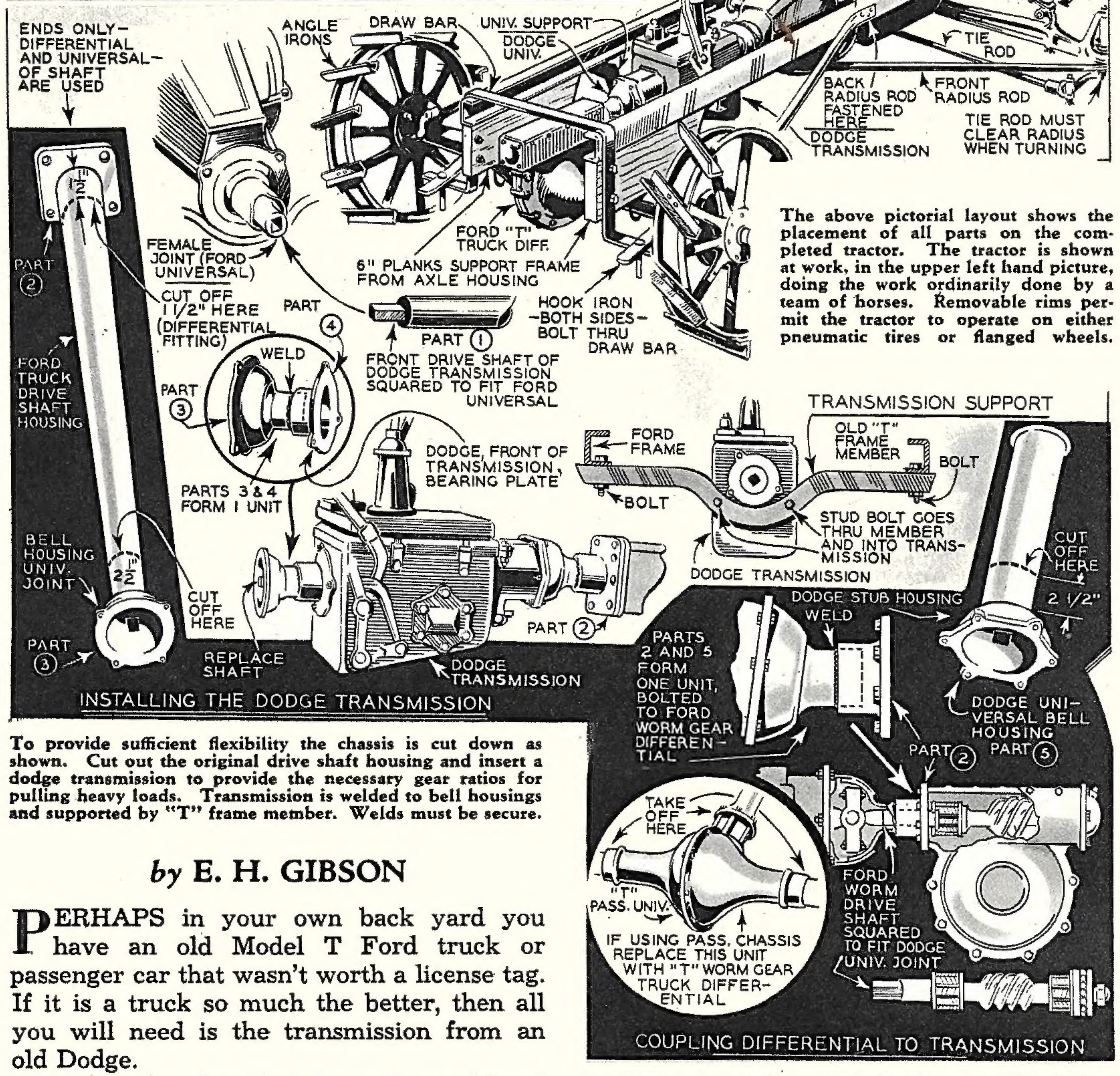
Build the fan compartment according to above specifications, mounting the motor on blocks for simplified adjustment. An old automobile fan is excellent for supplying necessary draft.

BUILD "HANDY HENRY" TRACTOR *for Twenty Dollars*

With T Fords available throughout the country any shop man can easily convert one into a practical tractor.



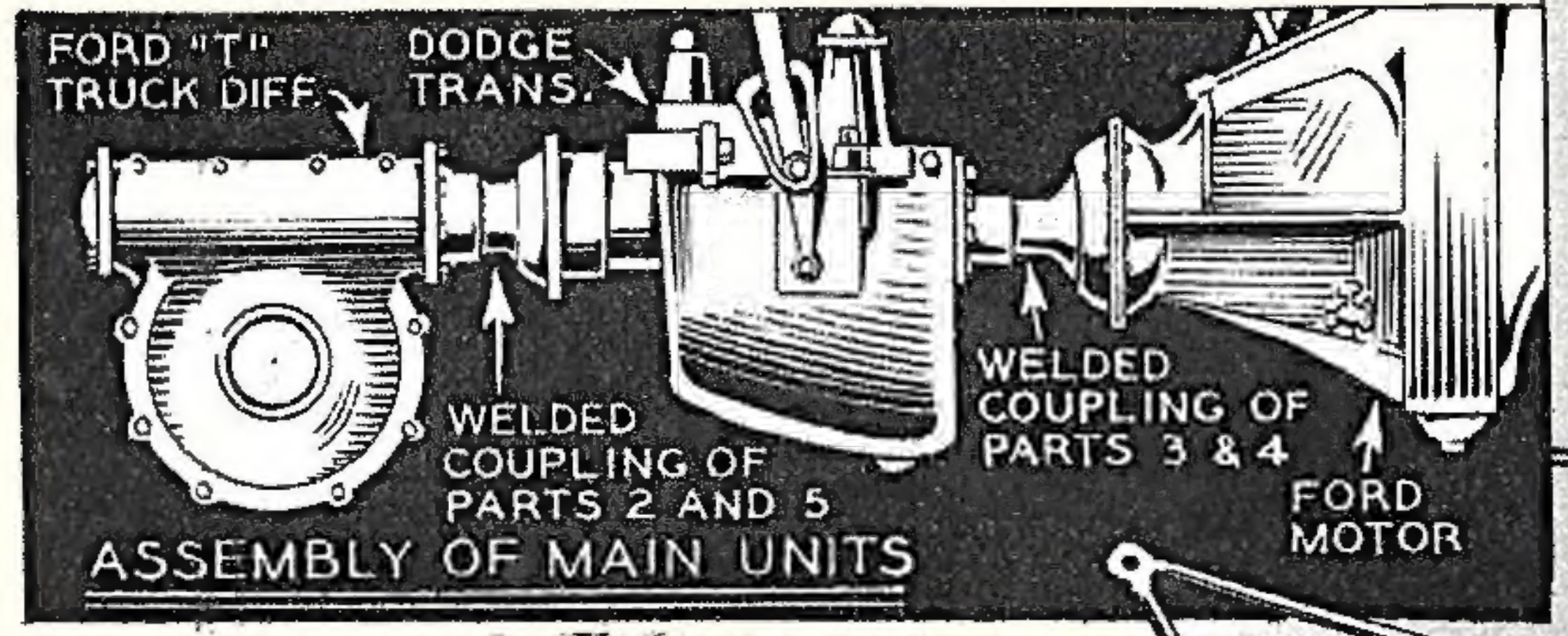

ASSEMBLY OF HANDY HENRY
TRACTOR NOW HAS 6 FORWARD AND 2 REVERSE SPEEDS— FORD AND DODGE TRANSMISSIONS ARE USED IN CONJUNCTION
FORD MOTOR
STEERING POST
SHORTENED SPRING

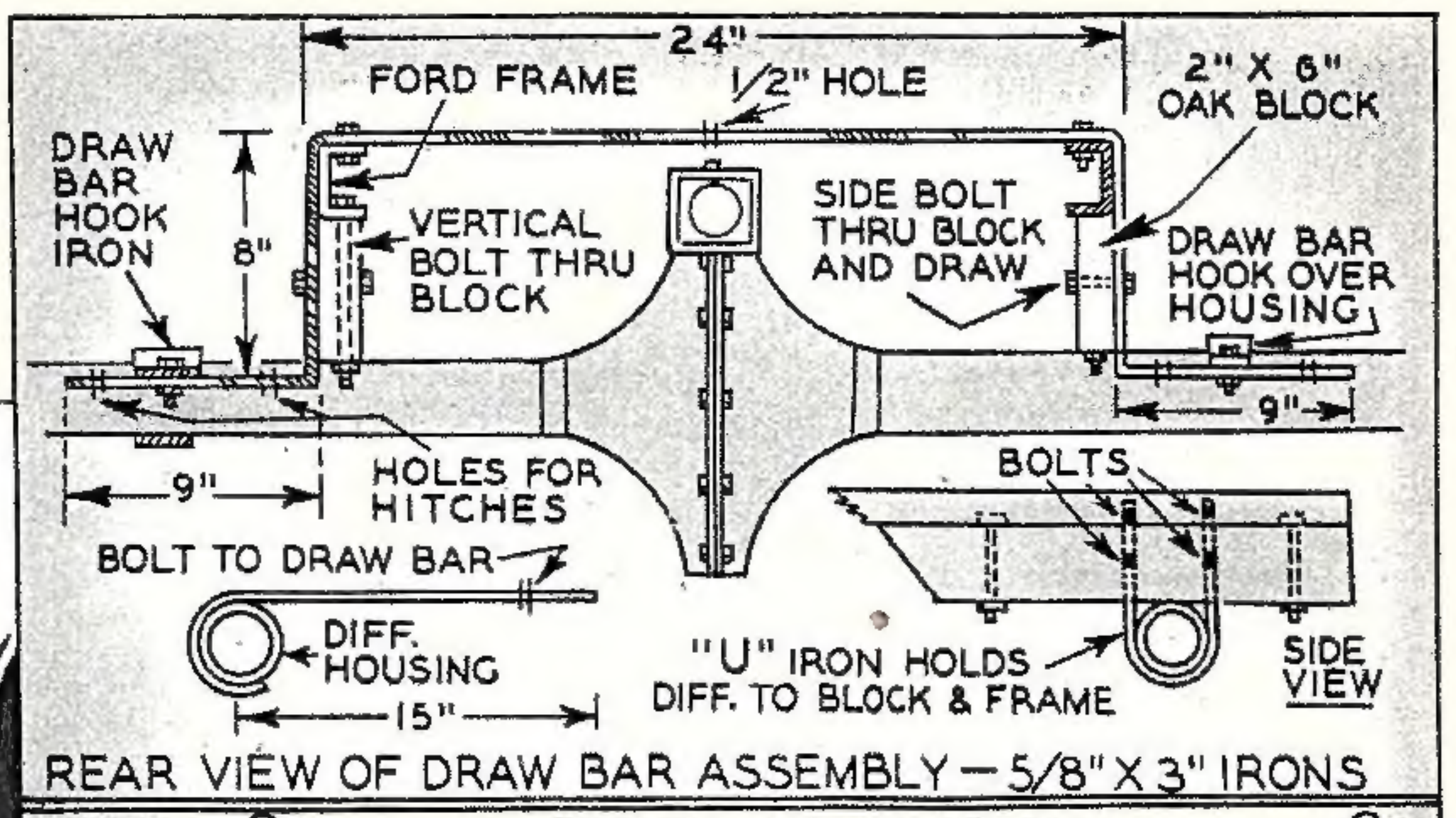

ENDS ONLY— DIFFERENTIAL AND UNIVERSAL—OF SHAFT ARE USED
ANGLE IRONS
DRAW BAR
UNIV. SUPPORT
DODGE UNIV.
TIE ROD
BACK RADIUS ROD FASTENED HERE
FRONT RADIUS ROD
DODGE TRANSMISSION
TIE ROD MUST CLEAR RADIUS WHEN TURNING
FORD "T" TRUCK DIFF.
6" PLANKS SUPPORT FRAME FROM AXLE HOUSING
HOOK IRON —BOTH SIDES— BOLT THRU DRAW BAR
1/2"
PART ②
FEMALE JOINT (FORD UNIVERSAL)
CUT OFF 1 1/2" HERE (DIFFERENTIAL FITTING)
PART ④
PART ①
FRONT DRIVE SHAFT OF DODGE TRANSMISSION SQUARED TO FIT FORD UNIVERSAL
WELD
FORD TRUCK DRIVE SHAFT HOUSING
PART ③
PARTS 3 & 4 FORM 1 UNIT
DODGE, FRONT OF TRANSMISSION, BEARING PLATE
BELL HOUSING UNIV. JOINT
2 1/2"
CUT OFF HERE
PART ③
REPLACE SHAFT
PART ②
DODGE TRANSMISSION
INSTALLING THE DODGE TRANSMISSION
TRANSMISSION SUPPORT
FORD FRAME
OLD "T" FRAME MEMBER
BOLT
BOLT
STUD BOLT GOES THRU MEMBER AND INTO TRANSMISSION
DODGE TRANSMISSION
CUT OFF HERE
2 1/2"
DODGE STUB HOUSING
WELD
PARTS 2 AND 5 FORM ONE UNIT, BOLTED TO FORD WORM GEAR DIFFERENTIAL
DODGE UNIVERSAL BELL HOUSING
PART ②
PART ⑤
TAKE OFF HERE
"T" PASS. UNIV.
IF USING PASS. CHASSIS REPLACE THIS UNIT WITH "T" WORM GEAR TRUCK DIFFERENTIAL
FORD WORM DRIVE SHAFT SQUARED TO FIT DODGE UNIV. JOINT
COUPLING DIFFERENTIAL TO TRANSMISSION

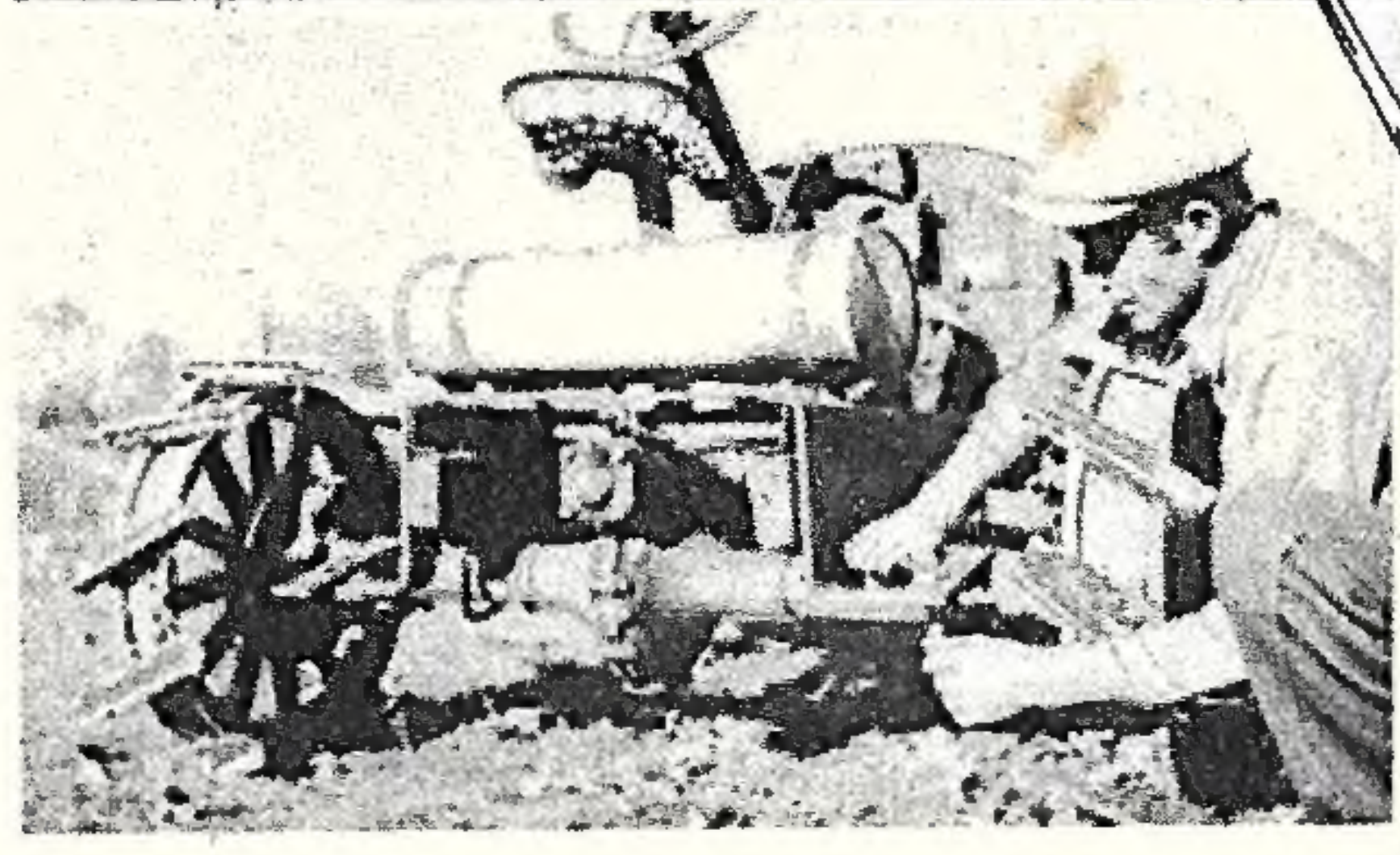
The above pictorial layout shows the placement of all parts on the completed tractor. The tractor is shown at work, in the upper left hand picture, doing the work ordinarily done by a team of horses. Removable rims permit the tractor to operate on either pneumatic tires or flanged wheels.

To provide sufficient flexibility the chassis is cut down as shown. Cut out the original drive shaft housing and insert a dodge transmission to provide the necessary gear ratios for pulling heavy loads. Transmission is welded to bell housings and supported by "T" frame member. Welds must be secure.

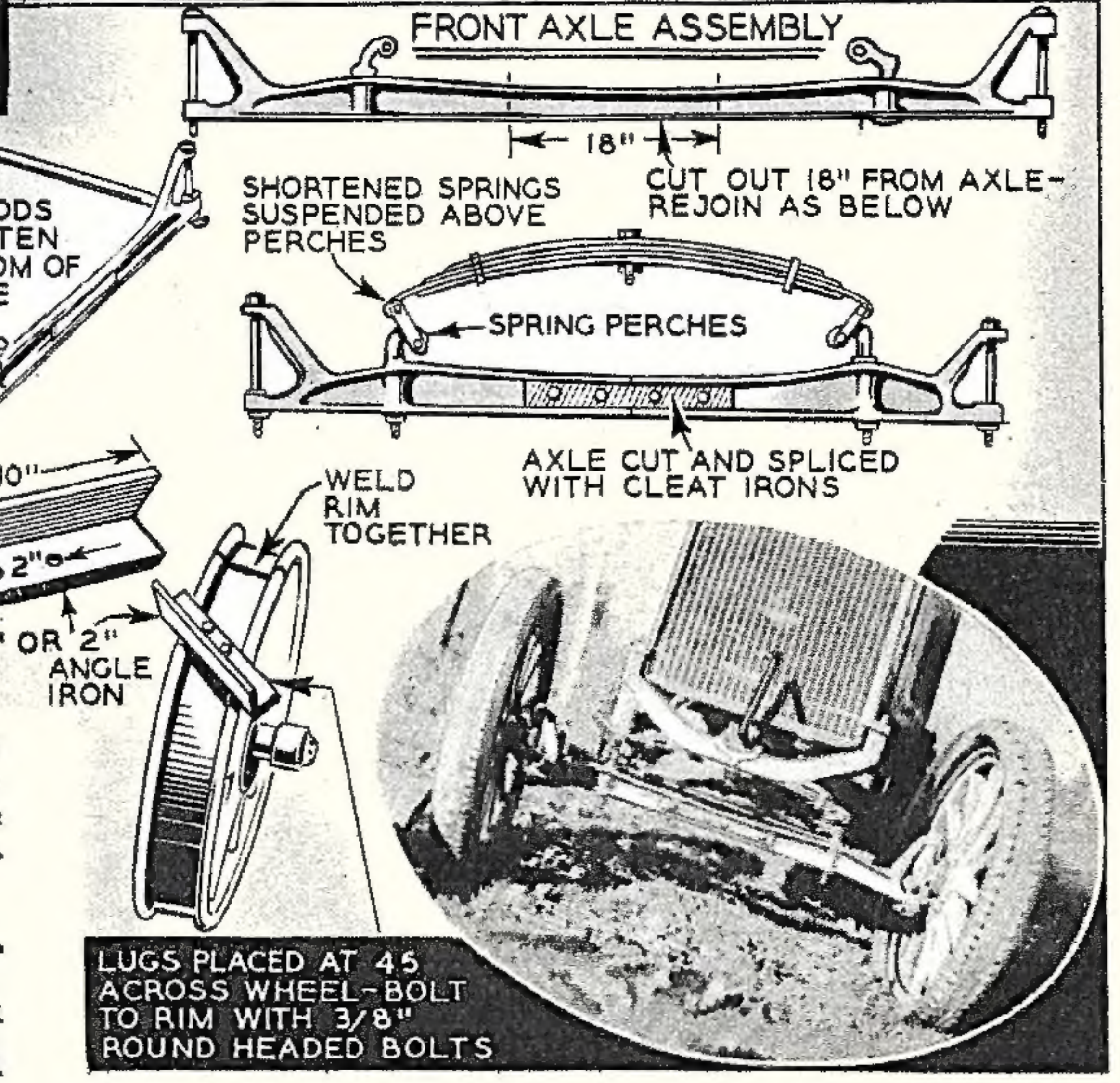
In order to use a double transmission the worm drive shaft on the Ford must be squared to fit the Dodge universal joint. If a passenger chassis is used for tractor replace the "rear end" with one taken from a "T" truck. Since all parts are numbered on diagram they may be easily identified in assembly. Part "A" in one diagram and part "A" in another are same.


FORD "T" TRUCK DIFF.
DODGE TRANS.
WELDED COUPLING OF PARTS 2 AND 5
WELDED COUPLING OF PARTS 3 & 4
FORD MOTOR
ASSEMBLY OF MAIN UNITS


24"
FORD FRAME
1/2" HOLE
2" X 6" OAK BLOCK
DRAW BAR HOOK IRON
8"
VERTICAL BOLT THRU BLOCK
SIDE BOLT THRU BLOCK AND DRAW
DRAW BAR HOOK OVER HOUSING
9"
9"
HOLES FOR HITCHES
BOLTS
BOLT TO DRAW BAR
DIFF. HOUSING
15"
"U" IRON HOLDS DIFF. TO BLOCK & FRAME
SIDE VIEW
REAR VIEW OF DRAW BAR ASSEMBLY—5/8" X 3" IRONS



The photo above shows the rear of "Handy Henry" and location of clevis holes. The draw bar is located in the center. Note manner in which differential is mounted to the chassis. The drawings depict the manner in which this is done.


FRONT AXLE ASSEMBLY
18"
SHORTENED SPRINGS SUSPENDED ABOVE PERCHES
CUT OUT 18" FROM AXLE— REJOIN AS BELOW
RADIUS RODS NOW FASTEN TO BOTTOM OF SPINDLE BOLT
SPRING PERCHES
AXLE CUT AND SPLICED WITH CLEAT IRONS
WELD RIM TOGETHER
10"
2"
1 1/2" OR 2" ANGLE IRON
LUGS PLACED AT 45 ACROSS WHEEL-BOLT TO RIM WITH 3/8" ROUND HEADED BOLTS

The axle splice is shown above. Since eighteen inches are removed here it is necessary to shorten front springs, too. The radius rod is fastened to bottom of spindle bolts instead of on the top as it was formerly. The flanged rims are built up from old rims which have been welded together at split joint and lugs bolted on to provide traction in soft earth.

by E. H. GIBSON

PERHAPS in your own back yard you have an old Model T Ford truck or passenger car that wasn't worth a license tag. If it is a truck so much the better, then all you will need is the transmission from an old Dodge.

The tractor described here is capable of handling any two horse load, at a faster speed than horses and on nominal gas consumption. It should be noted that the plans have been worked out in an effort to build this tractor without undue cost. Where possible, all fittings are made in your own work shop and it is not necessary to seek the aid of an expert machinest at any time. There are, however, several joints that must be welded. If the builder will note these and then have them all welded at once the welder will no doubt make a special rate for the complete job.

This little tractor is not an experiment, but a proven product that will, under normal conditions, handle any farm job done by two good horses and if a good motor is used it will easily handle a three horse load. It is not advisable, however, to overload the tractor as this would slow down the engine and reduce its horsepower output.

The tractor is made from parts of a Model T Ford truck and an old Dodge transmission. Any make of transmission may be used but the old Dodge is preferred for its rugged build and ability to stand up under long grinds in lower gear. The shifting on this model Dodge is just reversed from standard, in other words low gear is where reverse is on later model cars. If you do not have a Ford truck, but do have a passenger car, it will then be necessary for you to obtain a Ford truck differential. Any wrecking yard should supply one with low gears for not more than five dollars. The Dodge transmission should be bought for about $2.50.

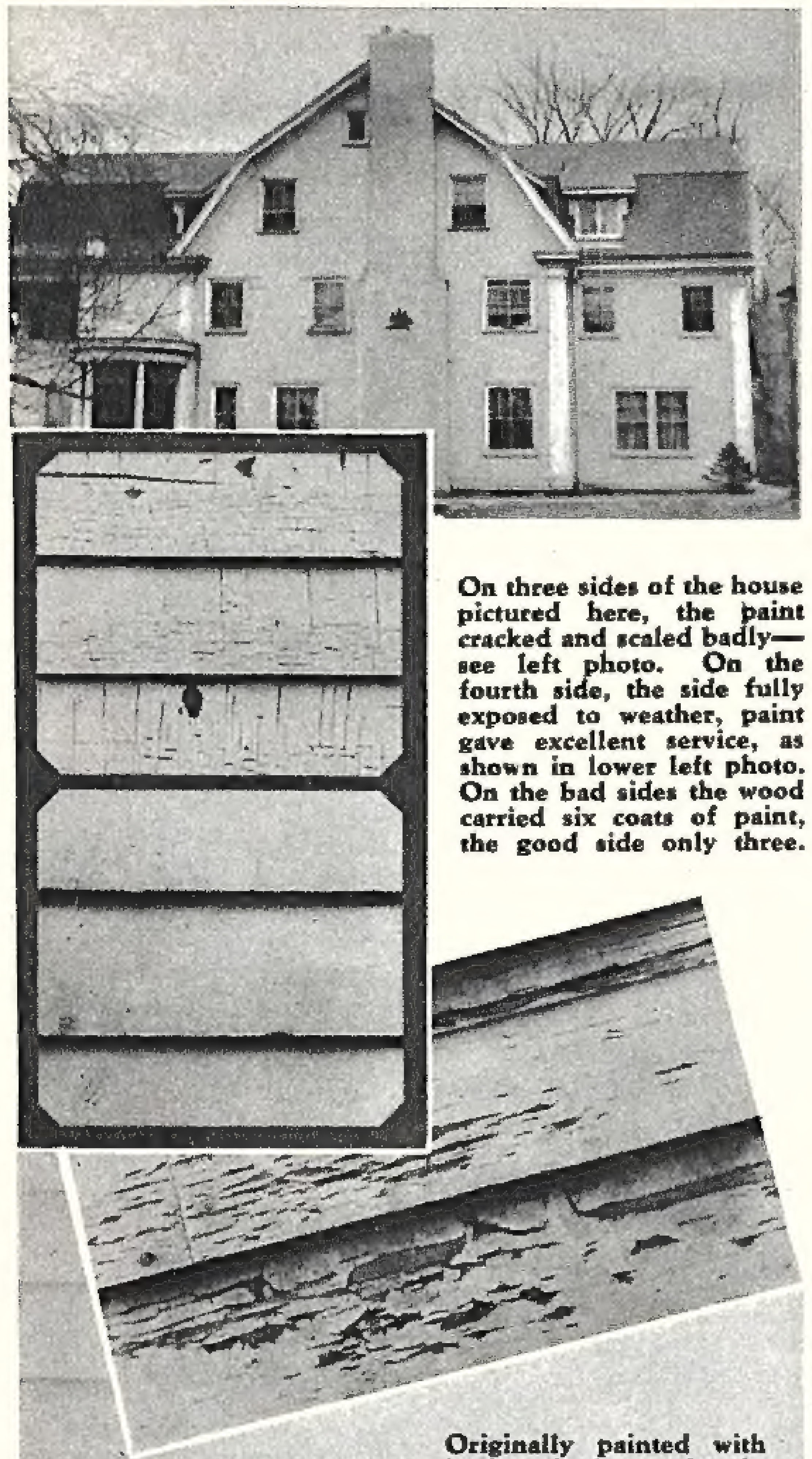
A regular T model passenger car frame is used and the first job is to strip it of all unnecessary parts, then block it up and remove the rear end which will later be replaced by the truck differential. A good radiator and motor are the important parts of the tractor and to aid in cooling a water pump may be installed. Next block up the front end and remove the front wheel assembly and spring. This is then dismantled. The object here is to narrow it up 16 inches to permit shorter turning. With a yard stick or tape find the exact center of the front axle.

[Continued on page 120]

PAINT WISELY and SAVE MONEY

by M. B. HOPKINS

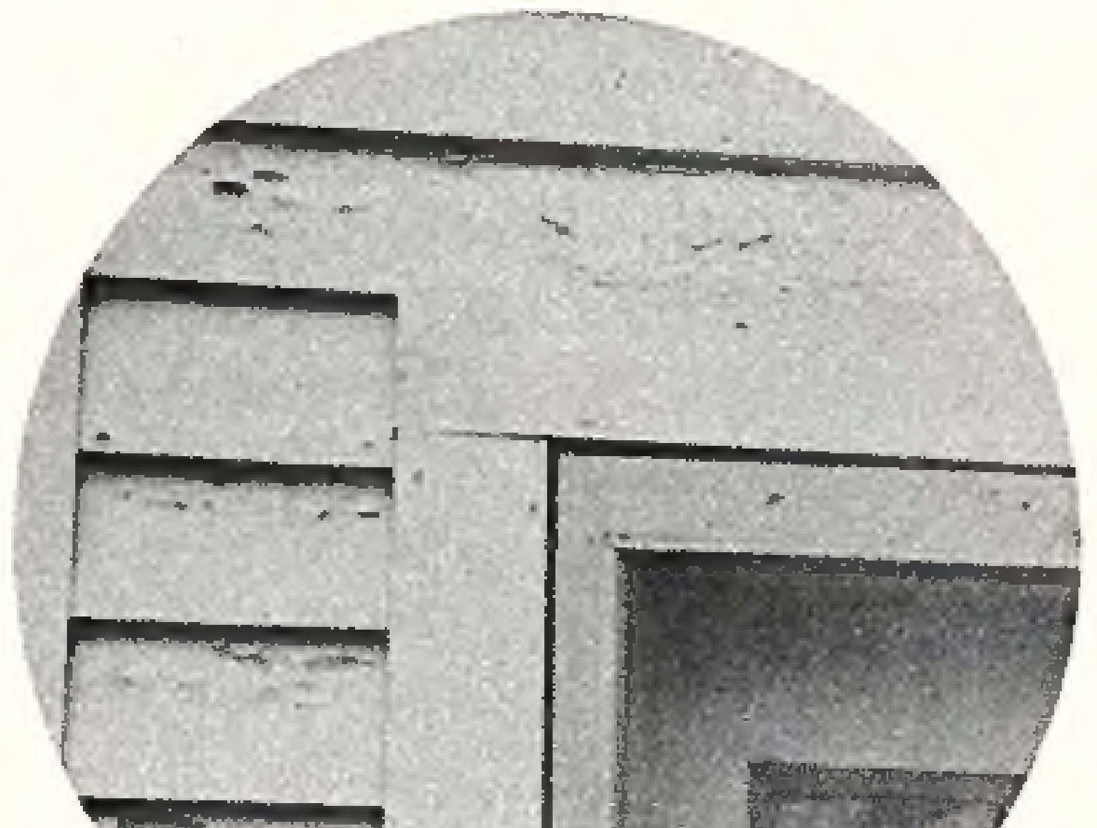
Going to paint your home? Expect trouble—blisters and such? Forewarned is forearmed, and this article may save you trouble.



On three sides of the house pictured here, the paint cracked and scaled badly—see left photo. On the fourth side, the side fully exposed to weather, paint gave excellent service, as shown in lower left photo. On the bad sides the wood carried six coats of paint, the good side only three.

Originally painted with lead and zinc and subsequently repainted with a titanox, lead and zinc type paint, photograph above shows paint failing in an unaccountable way.

An examination shows the paint above coming loose from the wood in large flakes. A magnifying glass proves that the coating disintegrates by cracking, curling and flaking up from the original paint.



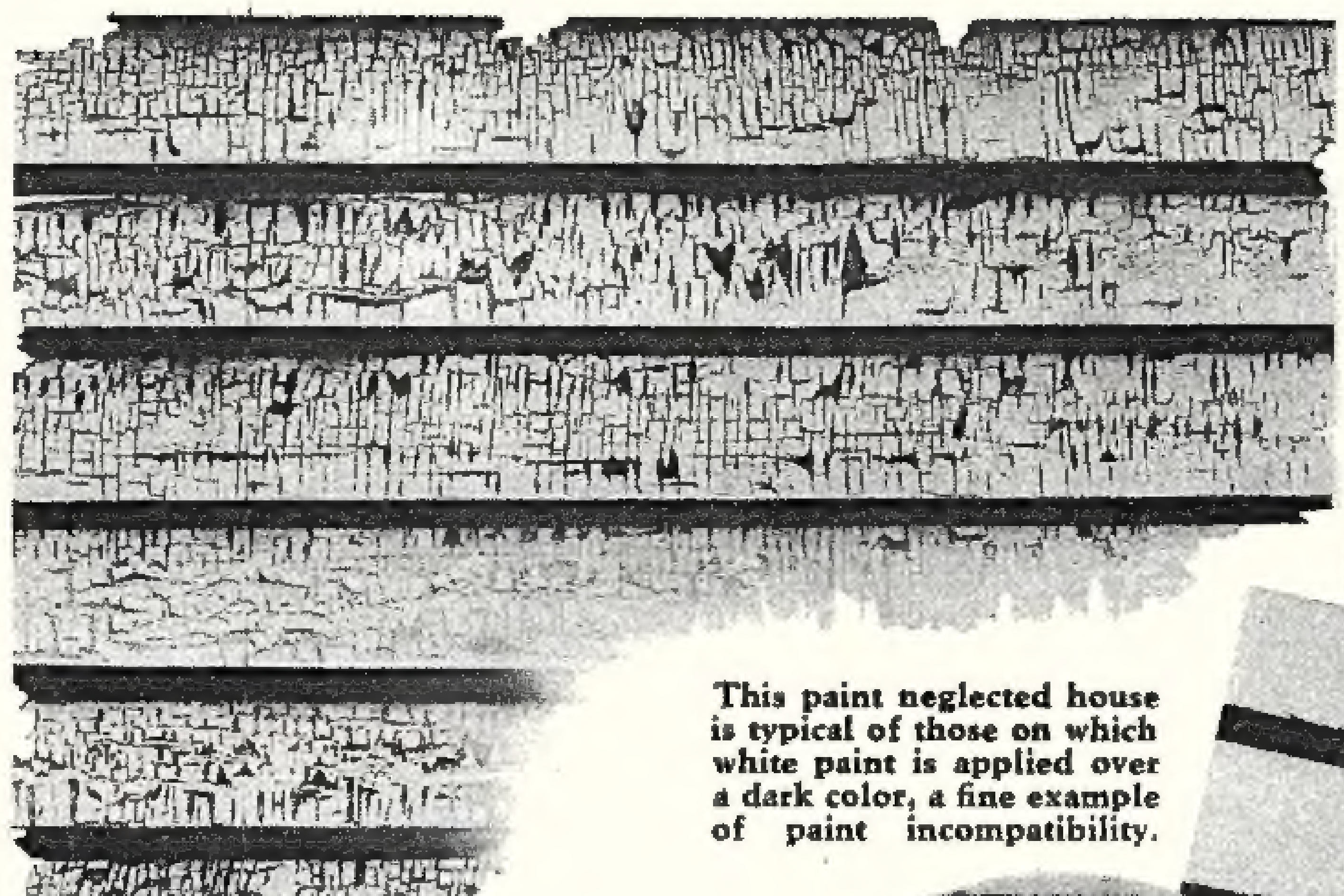
The house at the left was built in 1931 and painted with pure white lead, a satisfactory job. In 1934 it was repainted with a hard, quick-drying paint. The above photograph was taken only a year after it was applied.

HOUSE paint which cracks and peels in less than two years after application is failing unreasonably soon. If the previous coat held up well; if you bought the best quality paint and had it administered by reliable craftsmen, you are probably bewildered to know why the present coating has failed to keep its bargain with you.

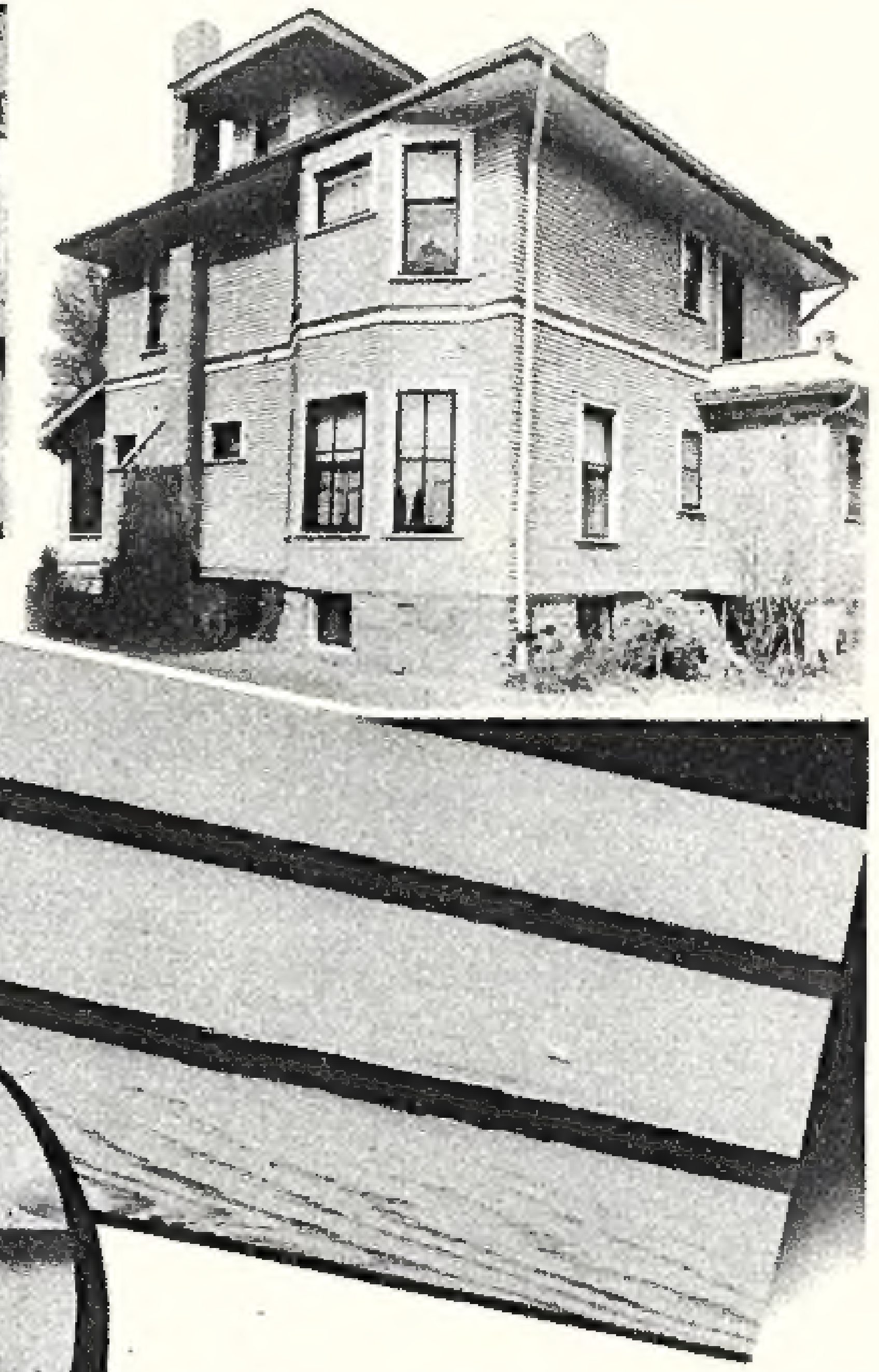
The reason may be one of a number which the United States Forest Products Laboratory at Madison, Wis., has discovered responsible for failure of exterior paint jobs.

If you are one of those owners, the repainting of whose home in the next year or two is an utter necessity, let the laboratory's findings safeguard you from the exasperation, and, worse still, unnecessary costliness, which are the outcome of mistaken painting practice. With a reliable painter as consultant, you can go a long way toward diagnosing the paint ills of your own home if you compare its symptoms with typical case histories recorded by the laboratory.

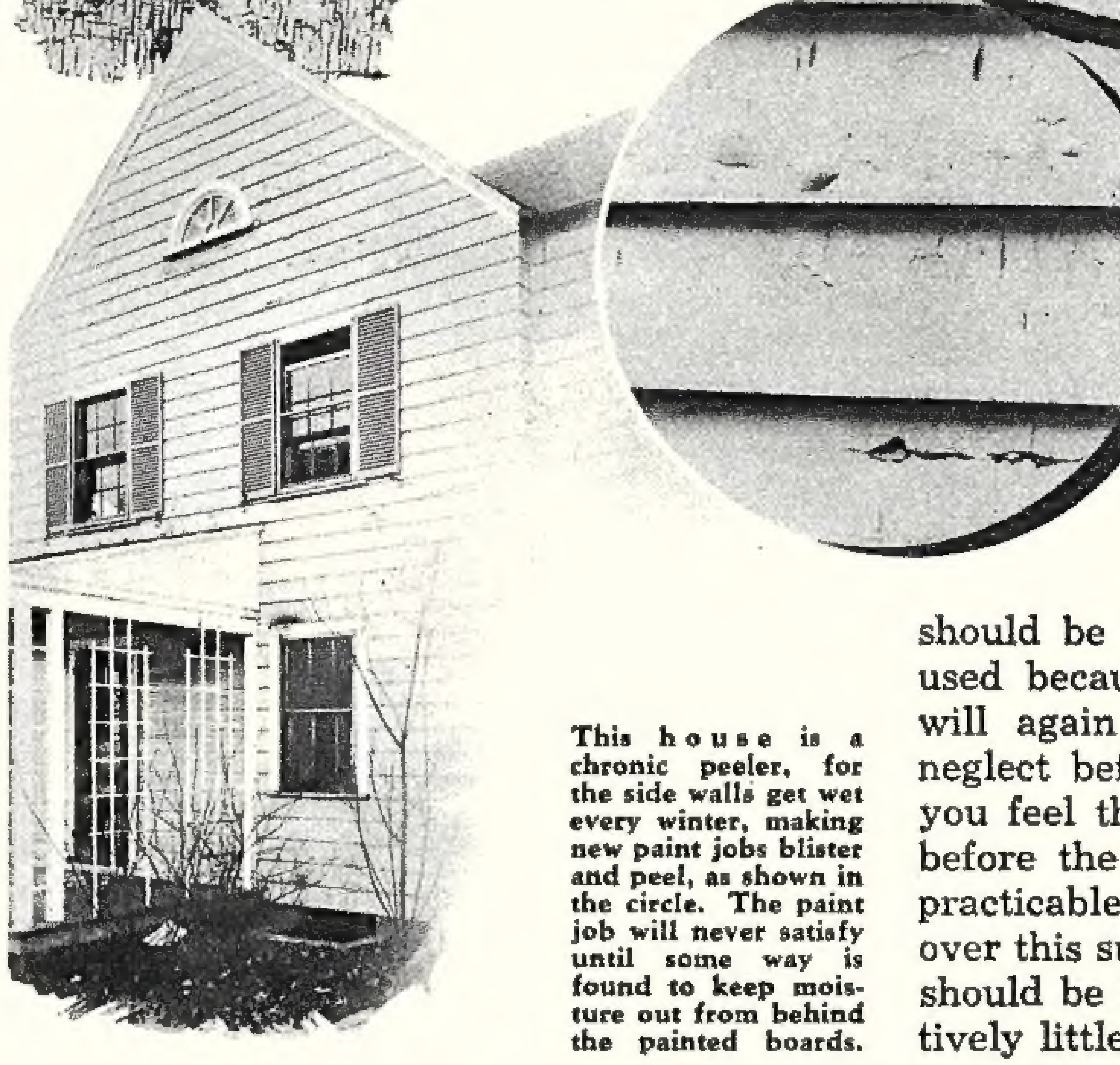
It is bad policy to try to apply a white or tinted paint over brown, green, or deep red. He who does so, does it at the risk of early "disagreement" between the colors. Even between whites and tinted whites, incompatibilities may exist, especially when differences in amount and kind of pigment are marked.



This paint neglected house is typical of those on which white paint is applied over a dark color, a fine example of paint incompatibility.



The house up above was not painted for eight years. From a distance the paint looked shabby. A closeup photo reveals the paint worn down to bare wood. Two new coats will fix it up fine.



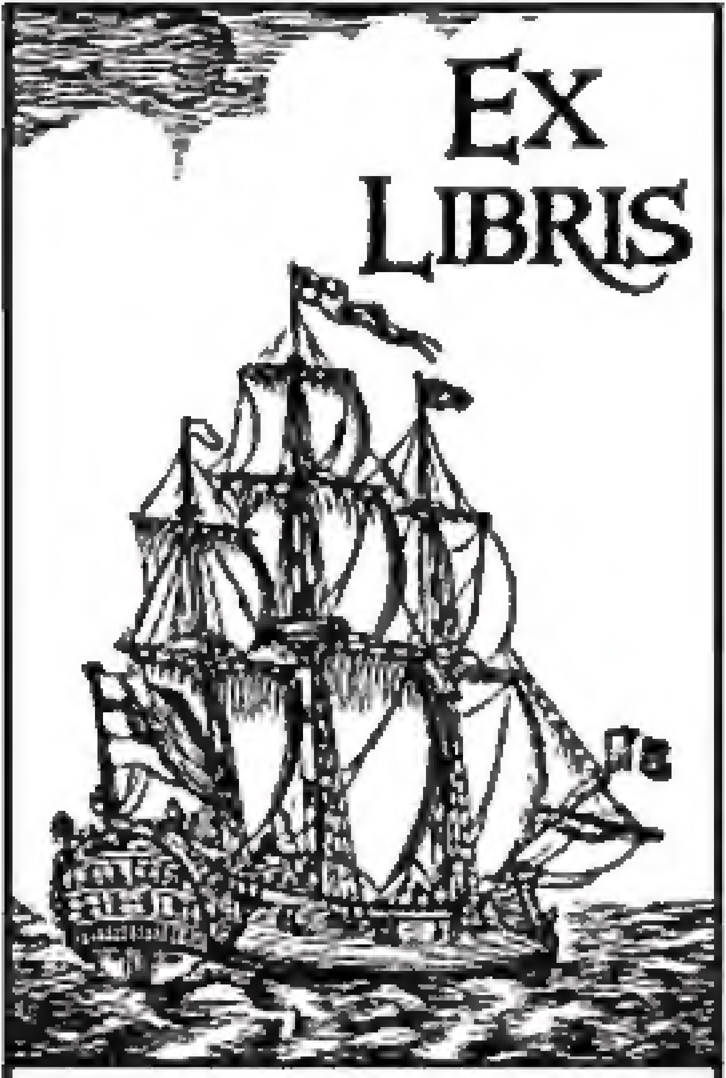
This house is a chronic peeler, for the side walls get wet every winter, making new paint jobs blister and peel, as shown in the circle. The paint job will never satisfy until some way is found to keep moisture out from behind the painted boards.

If your house has always been painted with the soft type of paint, but no new paint has been applied for seven or eight years and the coating has thoroughly disintegrated, you are in luck. Have the painter merely dust off loose chalk and dirt, perhaps cleaning a few places where soot or grease from oil-burning furnaces have collected on shaded parts of the building, and brush on new paint. Two coats of new paint are necessary.

As a rule, the new paint should be of the same soft type previously used because the chances are that the job will again pass through a long period of neglect before it is repainted. If, however, you feel that in the future you will repaint before the coating disintegrates badly, it is practicable to apply the harder types of paint over this surface. The first coat of new paint should be thinned with linseed oil and relatively little turpentine or other volatile thinner, using not more than 1¼ gallons of total liquid to 1 gallon of soft paste paint.

If your house has been painted and two or three times repainted with paints of a fairly hard type, but you have waited a little too long each time before calling in the painter, you've no doubt found successive repaintings less and less durable. If close inspection shows that the paint is disintegrating by flaking and scaling rather than by crumbling; if at the edges of the cracks the coating curls upward and eventually falls off leaving a patch of bare wood; if the coating still clinging to the wood has jagged and inse-

[*Continued on page* 130]



Anon. Malefactor